

# The Canadian Medical Association Journal

Vol. XVI

TORONTO, MAY, 1926

No. 5

## An Address

ON

### MODERN METHODS IN THE DIAGNOSIS AND TREATMENT OF HEART DISEASE

BY THOMAS F. COTTON, M.D., C.M., (MCGILL), M.R.C.P. (LONDON)

*Physician to Out-Patients, National Heart Hospital, London*

*Consulting Cardiologist, Ministry of Pensions, and to Queen Alexander Military Hospital,  
London*

THERE has been in recent years a great advance in our knowledge of diseases of the cardio-vascular system. This has taken place mainly in the last thirty years. Before this period a good deal of what was then known of cardiac disease was based on pathological studies. A great deal of information which has proved to be helpful in the recognition of structural disease was obtained from this source. Clinicians and pathologists by correlating their observations established a method of examination which enables us to recognize structural changes with a fair degree of accuracy at the bed-side. In the early years of this century the art of percussion and auscultation had reached a stage in its development which might be described as one of over-refinement. It was thought that one could by these methods of examination map out on the chest-wall—almost with mathematical exactness—the different chambers of the heart; that one could from the character of the heart-sounds distinguish all grades of endocardial and myocardial disease.

The weak spot in the equipment of the clinician at the end of the last century was his lack of knowledge regarding the cardiac arrhythmias. Nothing was known about the mechanism producing the different types of irregular heart action. The graphic registration of the heart-

beat was in its infancy. The laws governing the use of digitalis were not much different from those laid down by Withering. There was no clear line of demarcation separating that group of patients likely to benefit from the administration of digitalis from those whom this drug could not be expected to help. The advance in our knowledge of cardio-vascular disease came—in the early years of this century—with the advent of newer and more precise methods of clinical and laboratory investigation applied to the study of the circulation.

It was in the year 1899 that Cushny and Wenckebach from an analysis of arterial records described a type of irregular heart action due to extra-systoles. About the same time, Mackenzie, working with an ink polygraph which he had devised, from a study of the venous curves proved that Cushny and Wenckebach had given a correct interpretation to their arterial curves. Another type of cardiac arrhythmia, characterized by gross irregularity and the ventricular form of venous pulse, was described by Mackenzie. As there was no auricular wave, he thought this disordered action of the heart was due to paralysis of the auricles. A post mortem study of cases led him to abandon this hypothesis and to bring forward evidence that the auricles were active. The final proof that this

type of irregular heart action was due to auricular fibrillation was supplied by the electrocardiographic records of Lewis at University College Hospital and Rothberger and Winterburg in Vienna. Further investigations by Mackenzie showed that it is in this type of cardiac disorder that digitalis has its chief value.

In 1908 Lewis began his experimental and clinical researches with the Einthoven string galvanometer. He and his co-workers in the years which have followed, have built a solid and broad bridge of physiological facts. Clinicians everywhere were beginning to apply the lessons which the observations of Mackenzie and Lewis and others had taught them. Those particularly engaged in the study of cardiovascular diseases had become distrustful of certain physical signs regarded as valuable aids in diagnosis and prognosis. They felt that the current textbooks were ships carrying a great deal of useless cargo which could with advantage be thrown over-board. Then came the Great War. Never before was such an opportunity given to medical men to test and compare old and new methods. Vast numbers of men were examined, and the examination was of necessity a short one. There was no time for careful history-taking; only the briefest medical history was recorded, and for this reason the information obtained was not of much assistance to the medical officer. He was obliged to rely mainly upon physical signs, without the aid of special instrumental examination, in deciding as to a man's fitness to undergo the strain of war service.

The years 1914-18 became a clearing house for sorting physical signs that were helpful in prognosis from those which were of no real service. Errors in diagnosis and prognosis were soon recognized, for those men who had been accepted for military service were under constant medical supervision. The parade ground, the route marches, the reaction to infections proved to be more certain tests of cardiac efficiency than certain physical signs upon which the medical officer had been taught to rely. The R.A.M.C. was not slow in adopting throughout the army a method of examination which had as its main objects treatment and prognosis based on the reaction of the man to graduated exercises. This system was instituted at the Hampstead Military Heart Hospital in 1916 and was later continued at the Sobraon Military Hospital at Colchester. The

types of cases treated in these army hospitals fell into two main groups: Those with no gross signs of structural disease but with symptoms, and those with structural disease. The symptomatology—except in those with serious myocardial damage—was very much the same in the two groups. Such symptoms as are produced in men with ill health on slight physical exertion and described as the "effort syndrome"—breathlessness, palpitation, giddiness, precordial pain and undue exhaustion—both mental and physical—were the main symptoms complained of. Those with structural disease of the heart were invalidated out of the army. The others—and they were the majority of those treated—were given graded physical exercises. They were sorted into several categories according to their response to effort. It was found that many benefited from the graduated physical exercises, others showed no improvement, and in some there was an aggravation of all symptoms. This form of treatment by graduated exercises was also used as the basis of prognosis; it was not considered of much value in the diagnosis of structural disease, except in those patients with suspected angina.

The same methods adopted by the army have been employed by the medical officers at the Ministry of Pensions, and have proved equally satisfactory in the treatment of a very large number of ex-service men, who are in receipt of a pension for a cardiac disability. With these pensioners as in the army, an exercise test serves as a basis of prognosis and as an indication for treatment. Signs which are regarded in the army as indicating structural disease are accepted at the Ministry of Pensions for pension purposes; and abnormal signs disregarded as of no diagnostic and prognostic importance in the army are rejected at the Pensions Ministry as signs of organic heart mischief. I refer to these two public services, the army and pensions, for the reason that the method of examination which their medical officers employ has been applied to a vast number of men over a period of six to eight years, and during this time all experience has favoured, and nothing has developed to condemn this system of examination both as regards diagnosis, prognosis and treatment. An indication of the value of this method of examination is given from our experience of

its daily use for the past six years in the special Heart Clinic at University College Hospital. It has proved satisfactory in every way; the undergraduate easily learns to use this method, and the postgraduate finds it helpful in general practice.

The method of examination of the cardiovascular system which I propose to describe is based on the principle that abnormal signs when associated with a perfect exercise tolerance are of little diagnostic value, and of no prognostic importance; and conversely, that symptoms of congestive failure are always accompanied by signs of structural disease. If this law is observed in the routine clinical examination of the heart, it will be found that all cases may be divided into two groups—those with signs of structural disease, and those in whom such signs are absent. In all, the exercise-tolerance should be determined, and this will serve as the basis for a second classification; those with a good or fair response to effort, and those with a poor exercise reaction. It is of little importance what type of exercise test is employed—stair-climbing, dumb-bell lifting, or the chair test—all serve the same purpose provided a normal standard is known by which undue symptoms of distress can be recognized. From the history alone and the appearance of the patient, in many cases with structural disease, the exercise tolerance can be determined. The general appearance of the patient after exercise should be the guide in determining the exercise tolerance. Rise of pulse-rate, changes in blood-pressure and increased respiratory rate are fallacious signs when considered alone as tests of cardiac efficiency.

The signs of structural disease which matter are those which indicate failure with congestion or angina, cardiac enlargement, aortic dilatation, gross valvular disease, active infections, certain types of irregular heart action, and the state of the arteries. Signs of congestive failure are those of raised pressure in the venous system, and these should be looked for first. They are signs which are easily recognized when present: Cyanosis, with engorged veins in the neck, pulmonary congestion, hepatic engorgement, and oedema of the extremities, with breathlessness at rest. When these signs are observed, the diagnosis of

advanced myocardial disease can always be made, and the prognosis should be a grave one. There is another type of heart failure, with pain that is anginal in character and distribution, and usually without signs of venous congestion. Heart failure with angina is a symptom of grave myocardial disease, frequently it is of coronary origin, and often met with in middle aged men and elderly subjects. It is rare in women and the young. One grades these angina cases by the ease with which pain is provoked. It is a symptom of myocardial exhaustion, always associated with effort, often affected by emotional excitement, and sometimes complained of at night.

The next step in the examination is to determine the size of the heart. It is possible to estimate with sufficient accuracy for clinical purposes, by palpation and percussion, any increase in the size of this organ. The position of the cardiac impulse at the apex is especially valuable, and the percussion line though less helpful is a useful sign. If the outer border of maximum impulse is palpable definitely beyond the nipple-line and there is a corresponding extension of the area of cardiac dullness to the left, and there are no reasons to suspect displacement, these may be accepted as reliable signs of slight cardiac enlargement, and of myocardial damage. Considerable enlargement of the heart, i.e. beyond the anterior axillary line, is a sign of advanced myocardial disease. Moderate enlargement may be recognized as evidence of structural change in the heart muscle of less gravity. When there is submanubrial dullness and associated with this, pulsation is observed in the second interspace, and if there is corresponding dullness over this region, aortic dilatation is nearly always present, and this may be aneurysmal in character. Percussion to the right of the sternum is not a method to be relied upon in estimating the size of the right auricle.

The main purpose of the stethoscope in auscultating heart-sounds in acquired heart disease is to determine the presence or absence of mitral stenosis and of aortic insufficiency. Signs of chronic valvular disease of these types should be recognized because of their prognostic importance, for they indicate in most instances, structural changes in the myocardium which eventually lead to heart failure. The

mechanical obstruction of the narrowed mitral orifice, except in rare cases, is a small factor in the production of failure of the congestive type. The hypertrophied or dilated left auricle—sometimes it is the right auricle only which shows these pathological changes—is due to a rheumatic infection of the auricular wall. All evidence is against a physical basis as an explanation of these structural changes. If this view were more generally held, those who hope to improve the condition of the patient by cutting the mitral valve and in this way relieve the obstruction, will I trust realize that such surgical intervention is unjustifiable. In aortic regurgitation it is not the leak in diastole, because the valve is incompetent, that leads to heart failure. The extra work required of the heart could easily be performed if the ventricular muscle were sound. In aortic disease, the myocardium is damaged directly by the infecting agent, rheumatic or syphilitic, and indirectly from an insufficient blood flow through narrowed coronary arteries caused by the extension of disease from the valve area.

The systolic murmur as an isolated sign is of no prognostic importance. There has recently been completed at the Cardiac Clinic at University College Hospital a research, in part bearing on the significance of the systolic murmur as a prognostic sign. The after-histories of a large group of ex-service men suffering from the effort syndrome have been followed over a period of five years. In more than three hundred of these an apical or basal systolic murmur was recorded, without signs of cardiac enlargement. In some, about one-fifth of all cases in the series, there was a history of rheumatic fever. When these after-histories were completed at the end of five years it was found that the development of cardiac disease was the same in the two groups—those with systolic murmurs, and those in whom this sign was not present, the incidence of disease was one per cent in the two cases.

The rate and rhythm should always be noted. Rapid and irregular heart action, with the rate 120 or more, is due in most instances to auricular fibrillation. The more rapid the heart, the greater is the irregularity of the pulse in this type of arrhythmia. Sometimes, the ventricular rate is slow, and extra-systoles are suspected as the cause of the irregularity.

If the heart rate is raised by exercise or other means to 120 a minute, extra-systoles usually disappear, and the heart becomes regular until it slows down and again resumes its normal resting rate. An analysis of the after-histories over a period of five years of a large number of patients with extra-systoles with no enlargement of the heart and no valve disease, but with symptoms of the effort syndrome, is sufficiently strong evidence to support the view that extra-systoles are of no prognostic importance. Sinus arrhythmia from its relation to breathing is easily recognized. This type of irregularity may be of some prognostic value as a sign of a healthy heart. Auricular flutter without the aid of graphic records will be mistaken for auricular fibrillation. The prognosis and treatment is very much the same, so that the patient is not likely to suffer from the error in diagnosis. Heart block may be diagnosed when the ventricular rate is 40 counted with the stethoscope. It is not safe to rely on the pulse-rate, for extra-systoles heard at the apex may not be transmitted to the wrist. Rates in the forties or fifties may suggest heart block, but the diagnosis should not be made without a polygraphic tracing or electrocardiogram to confirm it.

During the last year of the war and the three following years, many men who served over-seas died with signs of subacute infective endocarditis. This disease is nearly always fatal and there was in consequence abundant post mortem evidence to confirm the observations which the large amount of clinical material allowed clinicians to make. These are the signs by which one may recognize this disease: chronic valvular disease associated with pallor, pyrexia, enlarged spleen, clubbing of the fingers, and embolic signs. A diagnosis can be made without a bacteriological investigation of the blood. In doubtful cases when one or two of the signs of infection are absent, a positive blood culture may clinch the diagnosis. A negative blood culture should not rule out a diagnosis of suspected subacute infective endocarditis.

The patient should be examined carefully for other signs of infection—local or general—for any infective process may lead to progress in the disease. The chief cause of cardiac disease

in the young is rheumatic fever; in middle life, rheumatic fever and syphilis; and in elderly people, senile changes. Determine, if possible, the causative agent of the disease and group all cases as of rheumatic, syphilitic, or indefinite origin.

Examine the arteries for tortuosity and high tension. Persistent high blood-pressure with thickened arteries is so often associated with renal disease that although gross signs of kidney damage may be absent, it is best to place patients presenting these signs in the renal group—or cardio-renal if symptoms and signs of myocardial disease predominate. Having done an exercise tolerance test, the physical examination of the patient is now complete in ninety cases out of one hundred. There are remaining 10 per cent or perhaps fifteen per cent who require electrocardiographic or other special investigation—such cases in whom cardiac disease is suspected.

It will be found useful for purposes of treatment to place all patients with structural disease of the heart in two groups:

1. Those with congestive or anginal failure.
2. Those in whom these signs or symptoms are absent.

Those in Group 1. with congestive failure fall into two classes: (A) failure with auricular fibrillation; and (B) failure with normal rhythm. Those in this group with angina can be graded according to the ease with which pain is provoked.

The treatment of congestive failure is based on restoring or improving the cardiac reserve by relieving a damaged myocardium of a load which it has failed to carry. A heart muscle so weakened by disease that it can no longer maintain the circulation requires rest. This is obtained by keeping the patient at rest until all signs of increased venous pressure have disappeared. One month at least of absolute rest is essential to achieve this object; two months are desirable, with a third month of slow convalescence. When the auricles are fibrillating, give sufficient digitalis to keep the ventricular rate within normal limits, and bromides, chloral or morphia to promote sleep and as an aid in maintaining physical and mental rest.

In patients with congestive failure and a normal rhythm, it will be necessary to rely on

rest and sedatives alone; digitalis is of little use here. There is good pharmacological evidence that diuretin has a dilating action on the coronary arteries. It may be that the administration of this drug by increasing the blood supply to the myocardium, improves the cardiac reserve, and in this way is of value in congestive failure with a normal rhythm. It is, of course, of value as a diuretic. A longer period of rest is usually required with the rhythm normal than with the auricles fibrillating.

The treatment of the anginal patient is in the main the management of his daily life: a simple diet, a fair amount of exercise, and a half-time working day. In all his activities he should avoid if possible such strain, physical or mental, likely to provoke pain. I doubt if drugs—apart from the nitrites—are of any real value in this type of heart failure. Morphia, of course, relieves the pain and should be given when severe. Potassium iodide is apparently helpful in some, more often those with the blood-pressure raised. Diuretin in my experience is helpful in patients with precordial pain due to some toxic cause, and I am in the habit of prescribing it in primary anginal cases who fail to show any improvement with potassium iodide.

The treatment of the patient with structural disease without signs of failure really turns on one's ability to prognose the course of the disease. As a working rule—whatever may be the valve defect—the larger the heart, the more advanced the myocardial disease, and the sooner may the symptoms and signs of failure be anticipated. The manner in which the heart responds to effort—such symptoms as shortness of breath, palpitation, giddiness, precordial pain, undue fatigue, and easy exhaustion—these should be our guide in determining the fitness of the patient to continue with his present occupation. The exercise tolerance is always poor when there is considerable enlargement of the heart; with no enlargement and valve disease, although it may be assumed that the myocardium is not sound, the cardiac reserve may be very little impaired.

Apart from general advice in choosing an occupation that is not an arduous one, and

playing games that are not strenuous, our chief concern should be to impress upon the patient the importance of obeying rigidly the general laws of hygiene—proper food, suitable work, sufficient rest, and a fair amount of amusement. The progress of the disease depends more upon intercurrent infections than upon physical strain, and if these can be avoided, the disease may remain stationary for many years. The removal of toxic foci if present, and a slow convalescence after an infection are essentials in the treatment of these

eases, particularly in valvular disease of rheumatic origin.

In aortic disease of specific origin, potassium iodide and mercury are indicated, as in other forms of tertiary syphilis. These should be combined with intravenous injections of arsenic given in somewhat smaller doses than those usually given in this disease with no cardiac defect. I am accustomed to give once a year a course of 0.6 gramme of novarsenobenzol in a series of six to eight intravenous injections at weekly intervals.

### An Address

ON

### CARDIAC AND RENAL DISEASE\*

BY I. M. RABINOWITCH, M.D.

*Assistant Professor of Medicine, McGill University, Montreal*

*Director, Department of Metabolism, Montreal General Hospital*

THE problem of cardio-vascular-renal disease has been approached from various points of view. Much has been done by the pathologist and clinician to classify the various lesions; numerous aetiological factors have been described; the various clinical signs and symptoms of the group, as a whole, are generally recognized; and there appears to be fairly general agreement as to treatment. The simplest procedure, therefore, to have followed in a paper upon this subject would have been to discuss, in order, the essential points of history, incidence, signs, symptoms and general treatment. This is undoubtedly the ideal and proper procedure when a disease is thoroughly understood, but how much more is now known of the complex picture of cardio-vascular-renal disease, than was known by our predecessors, may be judged by comparing data of its mortality rates. We hear much to-day of the ravages of tuberculosis and cancer, but data from the United States Bureau of Census show that in the total registration area of the United States, the death

rate from kidney, heart and arterial disease is almost twice that of tuberculosis and cancer combined, and the latest available records (1922) show that the present rate differs very little from that of twenty-five years ago.

	DEATH RATE PER 100,000 ESTIMATED POPULATION IN REGISTRATION AREA	
Diseases of the heart .....	1900	1922
Acute and chronic nephritis ..	132.1	165.7
Cancer and other malignant tumours .....	89.0	88.5
Tuberculosis (respiratory, acute disseminated and other forms) .....	63.0	86.8
	201.9	97.0

Because of the classification of diseases employed by the Bureau of Census, these data include deaths from acute nephritis and forms of heart disease not applicable to this discussion. Acute nephritis is, however, a relatively small factor. For example, in 1922, of 82,518 deaths from acute and chronic nephritis only 5,714 were due to the acute disease. In making a comparative study due allowance must also be made for the fact that nearly all persons who die of heart disease have passed middle life, and a true picture can only be drawn from a simul-

\* Delivered before the Academy of Medicine, Buffalo, N.Y., February 24, 1926.

taneous study of the age distribution of the population. The relative importance of these variables, however, is too insignificant to materially vitiate the conclusions drawn. Through the courtesy of Dr. William H. Davis, Chief Statistician for vital statistics, I have obtained the following records of the death rates from acute and chronic nephritis per 100,000 estimated population from 1900 to 1924. As just stated, the deaths from acute nephritis are relatively small.

DEATH RATE PER 100,000 ESTIMATED POPULATION, FROM  
ACUTE AND CHRONIC NEPHRITIS

Calendar year	Death rate
1900	89.0
1901	89.3
1902	90.9
1903	97.3
1904	103.1
1905	103.4
1906	97.5
1907	102.4
1908	93.7
1909	95.2
1910	99.0
1911	97.7
1912	103.2
1913	103.0
1914	102.6
1915	105.1
1916	105.6
1917	107.9
1918	97.6
1919	88.1
1920	89.4
1921	85.4
1922	88.5
1923	90.1
1924	89.5

It will be noted that the death rate in 1924 was practically identical with that found in 1900.

It is obvious therefore that cardio-vascular-renal disease is still a problem. For this reason I have chosen to discuss one particular aspect, (the study of which is now in progress), namely, the interpretation of signs and symptoms based upon observations on functional power.

A step forward in the study of kidney disease was made in the last decade by the application of physiological methods in the clinic. It is rather unfortunate that until recently the relative importance of the glomeruli and tubules in the production of urine has been the chief concern of investigators. The problem of renal activity as a whole, in relation to the various physiological processes in the body, a more inclusive study, and, at least

clinically, of equal importance was practically neglected.

That the newer laboratory methods are of diagnostic and therapeutic value can hardly be doubted. Nevertheless it must be admitted that many consider the various renal efficiency tests yield frequently unreliable information, and when reliable, the time taken to perform them is out of all proportion to their value. For these reasons a number of clinicians are strongly of the opinion that if careful consideration is given to the various clinical aspects, that is, careful history taking, proper physical examination, blood pressure determinations, and the use of the ophthalmoscope, renal efficiency tests, though of value, do not add much to the understanding of a case. The mortality data however suggest that these purely clinical methods by no means give sufficient information.

Renal efficiency tests are important. We now recognize that anatomical integrity is not a necessary requirement for functional efficiency, which is the chief concern of the clinician. An analogy may be found in the well recognized concept of cardiac pathology where the chief clinical concern is not the anatomical nature of the heart lesion. Prognosis is not necessarily measured by the size of the heart, nor by any particular valvular defect, but is measured chiefly by functional efficiency—the amount of work the individual can do without getting short of breath. Unfortunately, there is no such simple index of efficiency in the case of kidney disease. Various tests must be employed and the principles upon which they are based must be understood.

If procedures of the physiologist are found wanting, probably, in the majority of cases, this is not due to these being faulty, but to our failure to recognize the particular application of any given test and the particular significance of the results. Proof of this appears to lie in the fact that though many efficiency tests have been described, each based upon a different physiological function, the choice of methods, judging from the literature, generally appears to depend largely on the fancy of the clinician, and the results obtained are taken to record a fair picture of total renal efficiency. From the literature one may make any of the following deductions: if the phenolsulphonethalein excretion in the urine is normal the eliminating

power of the kidneys is normal; if there is no retention of uric acid, urea, or creatinine in the blood, the kidney function is normal, and there is no indication for the restriction of nitrogenous food; if the concentrations of the chlorides of the blood and urine are normal, there is no indication for the restriction of salt or water in the diet. Such deductions may be, and are, in the majority of cases, at least in our experience, quite erroneous.

In the interpretation of any test it is necessary to consider, firstly, the particular function of the kidneys to which the test employed is applicable; and secondly, the possible extra-renal factors which may influence results. It may not be out of place to dilate a little upon the latter.

The composition of urine depends not only upon the integrity of the kidneys, but upon the composition and amount of blood which they receive. The normal kidneys are very sensitive to these influences. They react to the slightest deviation from the normal composition of the blood. That is their chief function. Given a healthy kidney and uniform blood composition, decreasing the circulation will decrease secretion, and increasing the circulation will increase it. The circulation in the kidneys is dependent greatly upon blood pressure, and the results of very few renal efficiency tests can be properly interpreted without blood pressure findings. This observation has a particular application here because various concentration tests are employed in cardio-renal disease, and a frequent finding in these cases is the combination of a high systolic and normal diastolic pressure. Other conditions being equal, this results in an increased circulation, which must be taken account of in the interpretation of low concentrations of urine. But increased blood pressure does not always result in increased circulation. Given the same *mean* arterial pressure in two individuals the blood flow to the kidneys, and therefore, secretion in each case, may be different. Thus:

	<i>Subject A</i>	<i>Subject B</i>
Systolic pressure .....	190	170
Diastolic pressure .....	90	110
Mean .....	140	140

It is obvious that subject A will probably have a more dilute urine than subject B. In both

cases the effective head pressures, that is, the *mean* arterial pressures are the same, namely 140. In subject B there is, however, a greater peripheral resistance. This is an elementary deduction from the principles of hydrostatics.

When tests involve the injection or oral administration of substances there are other considerations. For example, the eliminating power of the kidney is frequently measured by the rate of excretion of phenolsulphonephthalein. Little consideration is, however, given to the possible affinity of other tissues of the body for the dye, and it is this extra-renal condition which probably explains the extraordinary results sometimes noted, especially in the cardio-renal group of cases, and which are incompatible with the clinical picture. The results of salt and water elimination tests do not depend entirely upon renal efficiency. The elimination of water by other channels (the skin, lungs and intestines) must not be lost sight of, and the elimination of salt by the skin may at times be of more account than is generally recognized. An extreme instance, obviously not met with under ordinary circumstances, may be cited in illustration. Douglas and Priestley quote Moss as having shown that miners may lose as much as two and one-half kilograms of sweat per hour, containing 0.2 per cent sodium chloride, that is, five grams of salt. Again, in the interpretation of the results of tests involving the ingestion of urea the rate of absorption of this substance from the alimentary canal, its concentration in the blood, and the urine volume output must all be considered. These are a few of the many examples that might be cited.

It appears that though employed very freely, little proper use is made of these tests, and this probably accounts for the present attitude of some clinicians. Each test measures the efficiency of a particular function of the kidney, and the disturbance of any one particular function probably results in some disturbance in the clinical picture. It is, however, the correlation of these clinical and laboratory findings which is so necessary, although with our present knowledge it is not always possible.

Renal efficiency tests may be of value for another purpose. Much must still be done to further clarify the complex picture of cardio-renal disease. Numerous authorities regard the cardio-vascular and renal aspects of this condi-

tion as distinctly separate diseases; an equal number oppose this view and look upon these as phenomena of one disease. This much-debated question has been approached from various points of view. It appears, however, that little consideration has been given to the possible value of functional observations. This we have attempted.

In approaching this subject I may say that exceptional facilities are available for such an investigation at the Montreal General Hospital. The situation of the metabolism laboratories in which renal tests are performed, is such that its activities are not confined to any one particular service or group of cases. The laboratory is responsible for service to all departments, medical and surgical. Renal efficiency tests, whether simple or more elaborate may be requisitioned with the same facility as throat cultures, Wassermann tests, or x-ray examinations. The result of this system is that practically all patients admitted to the hospital with albuminuria are as a routine observed with reference to the efficiency of their kidneys. In acute cases repeated observations are made at regular intervals. A large amount of material, obtained under uniform conditions, thus becomes available for study. During the past five years over 20,000 such observations have been made.

Our observations will be confined to two groups of cases. The selection of these was based upon Christian's<sup>2</sup> clinical classification of nephritis which is as follows:

- A. Acute nephritis.
- B. Sub-acute nephritis.
  - 1. With œdema.
- C. Chronic nephritis.
  - 1. With œdema.
  - 2. Hæmorrhagic nephritis.
  - 2. Without œdema.
  - 3. Vascular hypertension progressing into nephritis.

The groups observed were chronic nephritis without œdema and vascular hypertension progressing to nephritis. The object was to make, firstly, a large series of observations in each group of cases, and then apply statistical methods in the treatment of the results.

A choice of renal efficiency tests for this study was necessary and obviously difficult, since any one test does not measure the efficiency of all the functions, and all functions cannot at present be measured. Any test,

imperfect as it may be, is acceptable for statistical purposes if (a) it measures a very prominent function of the kidneys, if (b) the effects of extrarenal factors can be reduced to the minimum, if (c) it very readily detects the characteristic impairment of the kidneys in the particular disease observed. Urea concentration tests fulfill these postulates, at least fairly well, and on them the conclusions and opinions to follow have been based. The greater part of the energy required to cause the necessary changes in molecular concentrations of substances from those existing in the blood to those found in the urine is expended in concentrating urea and the greater the degree of concentration the greater the work done per gramme. This work may be calculated. In normal individuals, the kidneys do an average of 17 kilogram-meters of work in this process for every gramme of urea excreted.<sup>3</sup> The relative amount of work done may be judged from the following. In one case we calculated that of 39 kilogram-meters of work done in concentrating urea and sodium chloride during a two hour period, 37.2 kilogram-meters were expended in concentrating urea.

Extrarenal influences may also be greatly reduced with urea tests as compared with other procedures. Urea is practically evenly distributed throughout all the body tissues. It will therefore exert very little osmotic pressure influence across the membranes of the body. This is a great factor in altering blood flow, which, as noted before, influences kidney activity. Urea is a substance normally eliminated by the kidneys and the two chief factors, other than the excretory ability of the kidneys, namely concentration of urea in the blood, and urine volume output, can be reduced to the minimum by the procedure employed.

Urea tests are also of particular value in this study since a characteristic feature of chronic nephritis without œdema is a diminished rate of urea excretion in the early stages, and retention of urea in the blood when the disease has advanced.

The tests employed were blood urea concentration and the "urea concentration factor".<sup>4</sup> The latter represents the ratio of the concentration of urea in the urine to the concentration of urea in the blood. This test has been employed in this hospital during the last four years,

particularly for the detection of early impairment of renal efficiency. Previous observations<sup>4</sup> which we have reported showed that in 284 subjects with nephritis, the urea concentration factor showed impairment of efficiency in 94 per cent of cases whereas the concentration of urea in the blood was found increased in only 44 per cent. The reason for the relative sensitivity of these tests is obvious. When the kidneys become impaired, when they lose their flexibility of response to the changes in the composition of blood, the rate of excretion of urea diminishes. If only mildly impaired in concentrating power, the kidneys may by constant work excrete the total products of metabolism of the day. There will therefore be no retention. This "factor" is an index of the concentrating power and is therefore a test of early impairment.

That extrarenal factors are reduced to the minimum under proper conditions in this test is shown by the comparative data<sup>5</sup> obtained with it, and Van Slyke's<sup>6</sup> "secretory constant" which takes into consideration the effects of urine volume output and blood urea concentration. Under the same conditions the coefficients of variation of each in normal subjects are practically identical. Thus:

	<i>Normal mean</i>	<i>Standard deviation</i>	<i>Coefficient of variation</i>
Factor.....	47.3	+6.9	14.6
Constant.....	9.8	-1.4	14.3

With a relatively reliable renal efficiency test we may approach the problem now under consideration.

Since hypertension is a prominent sign of cardio-vascular disease and albuminuria is a prominent sign of renal disease, it appeared ideal to make functional observations, firstly on individuals with these phenomena only. We would thus be dealing with the disease in its early stages. We have had an opportunity during the last five years of observing seventy-two individuals, who were either refused life assurance policies, or were told that it would be necessary for them to pay a premium higher than the normal, because of the findings of increased blood pressure, albumin or casts in the urine. In no case were there any other clinical signs nor symptoms. To employ the

insurance term, these individuals had no other impairment. We have thus had an opportunity of dealing with these signs in the early period of the development of the cardio-vascular-renal complex.

In all of these cases the concentrations of urea in the blood were found to be normal. This was to be expected, since urea retention is a late phenomenon of the disease. The results of the urea concentration factor test presented a different picture. Impairment in concentrating power was found in forty cases. A more detailed classification of the cases yielded what appears to be more significant information. The system employed by the life insurance companies was followed, and hypertension, albuminuria, and the presence of casts in the urine were treated as different impairments. By this method the cases fell into the following groups:

- A. Hypertension. No albuminuria.
- B. Albuminuria. No casts. No hypertension.
- C. Albuminuria. Casts. No hypertension.
- D. Albuminuria. Casts. Hypertension.

Table 1 shows briefly the combined results. It will be noted that in seventeen out of twenty-four cases (70.8 per cent) of hypertension with no albuminuria the functions of the kidneys were normal. (It is understood that the term

normal function employed throughout the discussion refers to urea excretion). If details of blood pressure findings are considered, four of the subnormal urea concentration factors could be explained on the basis of increased excretion of water due to increased circulation rather than renal insufficiency. In these cases the systolic pressures were increased, but the diastolic pressures were normal. That there was very little impairment in these seven cases is obvious from the mean value of the "factor" for the group as a whole. This value was normal.

The results were different in the cases of albuminuria with no hypertension. Taking Groups B and C together, that is, albuminuria with and without casts, impairment in concentration power was found in 82 per cent of cases

TABLE I.—AVERAGE UREA CONCENTRATION FACTOR VALUES AND AVERAGE AGE OF EARLY CASES OF HYPERTENSION AND ALBUMINURIA

<i>Group</i>	<i>Incidence</i>	<i>Average factor</i>	<i>Subnormal factor</i>	<i>Average age</i>
A. Hypertension No albuminuria.....	24	48	7	44
B. Albuminuria. No casts. No hypertension.....	10	40	6	38
C. Albuminuria. Casts. No hypertension.....	35	33	31	40
D. Albuminuria. Casts. Hypertension.....	3	31	3	42

(thirty-seven out of forty-five). When these two groups were treated separately, it will be noted that impairment in efficiency was found to be greater in those cases of albumin with casts than albumin without casts. It is of interest to observe that these findings are fairly in accordance with the mortality findings of life insurance companies, and offer further proof of the relative value of this test. The data of these companies are difficult to contest. They are based upon statistical treatment in the true sense of the word. Unfortunately we must admit that the term statistics as applied to most medical data is deserving of anything but the term statistics. Mortality data of these companies, in general, show that in a group of cases of albuminuria with casts, the death rate is greater than in a group of cases of albuminuria with no casts. The average age of these individuals observed is also of significance. It is the age at which "Bright's disease" becomes an important cause of death.

Since we are dealing here with cardio-vascular-renal disease in its very early stage it appears reasonable to deduce that the cardio-vascular cases are in a group by themselves. Hypertension is the first sign noted. They have no albuminuria at this stage and their kidneys are functioning normally. The renal cases are in a group by themselves. In this group kidney efficiency is impaired at the early stage and at this time there is no hypertension. A reasonable deduction which may be made here is that hypertension, whatever its cause or causes, does not appear to be a sign of chronic nephritis, but rather a phenomenon produced by some other cause during its course. This view may not be in accordance with that generally held. It differs in one respect, that

it is the result of experimental and statistical study, and can be proven or disproven by further observations. It is not the result simply of traditional belief, proof of which is remotely possible.

There is some clinical evidence in favour of this view. Though the predisposing factors described by various authors have appeared to be the same in both groups of cases, their incidence has not been found to be the same. A prominent factor in one group, namely the cardio-vascular, appears to be heredity, and in the other, infection. In a recent study of a large series of cases Mortensen<sup>7</sup> emphasized heredity as an important aetiological factor in arterial disease, and quoted similar observations by Osler, and more recently by O'Hare. Mortensen's studies suggest "an inherited inability to metabolize protein". He bases his conclusions upon uric acid studies. Evidence suggestive of this is found in Major's<sup>8</sup> recent guanidine studies on subjects with hypertension. This writer has demonstrated a diminished urinary excretion of guanidine in these cases. The common finding of hypertension in the advanced stage of the disease may therefore possibly be explained in the following manner. In individuals with hypertension, if this is due to an "inherited inability to metabolize proteins", there may be a constant excess of guanidine or other pressor substances in the blood stream. Hypertension following nephritis could then be explained as due to the retention of the pressor substances produced at a normal rate, but imperfectly excreted.

As we analyzed in detail our data of 300 individuals with advanced disease the picture was very suggestive. The evidence at a first glance appeared to be conflicting, and it was

difficult to group the subjects. Most individuals had albuminuria, hypertension and enlargement of the heart. Pathological changes in the fundi did not appear to be of great assistance in differentiating the cases. The diagnosis by the ophthalmologist in some cases were definitely recorded "albuminuric retinitis". On the other hand, the great majority of records consisted of detailed descriptions of the findings, and the diagnoses were left to the clinician. In most of these cases it was very difficult to differentiate the findings of albuminuric retinitis from those of vascular sclerosis. The general clinical picture of the individuals appeared to be the best guide in grouping the subjects for analysis and this was followed.

The cases fell into two great groups, namely, those predominantly cardio-vascular, and those predominantly renal. Since there were a number of individuals with hypertension and no albuminuria and with albuminuria and no hypertension, the subjects were then further divided as follows:

1. Predominantly cardio-vascular.  
Sub-groups (a) no albuminuria.  
(b) with albuminuria.
2. Predominantly renal.  
Sub-groups (a) with no hypertension.  
(b) with hypertension.

These cases did not, for obvious reasons, include the cardio-vascular cases with a history of endocardial disease. That the latter type of case was fairly well eliminated may be judged from the observed incidence of "rheumatic" history. This incidence was found to be not greater than that observed in a control group of an equal number of individuals in the medical wards with diseases other than cardio-renal; in fact, it was less.

A few clinical features noted are worthy of mention. These are briefly recorded in Table 2. Age and family history appear to be differentiating points. In the cardio-vascular group, the average age of the individual was 58.6 years, whereas in the renal group it was 42.3 years. If the cases with hypertension are excluded from the renal group the average age of the latter is 39.0 years. It will be noted (Table 1) that the latter corresponds very closely to the average of the early cases of albuminuria without hypertension which was 39.5 years. A positive family history was found in 54 per cent of the cardio-vascular, and in only 24 per cent of the renal group. Excluding the subjects in the renal group with hypertension, a family history was found in 21.8 per cent of cases. The incidence of eye changes was found to be equally great in the cardio-vascular as in the renal group. The percentages were 63.3 and 58.0 respectively. Heart enlargement was found in 70.3 and 61.4 per cent respectively.

The functional observations yielded more definite information. Some of these are briefly recorded in Table 3. Normal blood urea values were found in 136 or 42.5 per cent of the whole series. The percentage incidence was however more than twice as great in the cardio-vascular than in the renal group. The values were respectively 64.2 and 27.0 per cent. The average values of the urea nitrogen were respectively 28.0 and 59.3 mgm. per 100 c.c. of blood. Normal "factors" were found in thirty-eight cases or 7.9 per cent of the whole series. This strikingly demonstrates the relative value of these two tests. The average value of the factor for the whole series was 26.8. For the cardio-vascular group it was 29.7 and for the

TABLE II.—PERCENTAGE INCIDENCE OF CLINICAL PHENOMENA IN CARDIO-VASCULAR AND RENAL GROUPS

	Cardio-vascular	Renal	
		whole group	with no hypertension
Age (average) years.....	58.6	42.3	39.0
Family history (percentage incidence).....	54.0	24.0	....
Eye changes (percentage incidence).....	63.3	58.0	....
Heart enlargement (percentage incidence).....	70.3	61.4	....

TABLE III

	<i>Whole group</i>	<i>Cardio-vascular</i>	<i>Renal</i>
Normal blood urea (percentage incidence).....	42.5	64.2	27.0
Average urea-N (mgms. per 100 c.c.).....	....	28.0	59.3
Normal factor (percentage incidence).....	7.9	....	....
Average value of factor.....	26.8	29.7	23.0
" " with albuminuria.....	....	28.0	....
" " without " .....	....	32.0	....

TABLE IV.—GROUP-AVERAGE FACTOR-BLOOD PRESSURE-ALBUMINURIA RELATIONSHIPS

	<i>With albuminuria</i>			<i>Without albuminuria</i>		
	<i>Normal Sys. and Dias.</i>	<i>High Sys. Normal Dias.</i>	<i>High Sys. High Dias.</i>	<i>Normal Sys. and Dias.</i>	<i>High Sys. Normal Dias.</i>	<i>High Sys. High Dias.</i>
Cardio-vascular...	0	28.3	31.6	0	26.4	32.0
Renal.....	24.4*	28.8	21.3	..	....	....

\*Figures indicate average value of factor.

TABLE V.—GROUP-BLOOD PRESSURE RELATIONSHIPS

	<i>Normal systolic and diastolic</i>	<i>High systolic Normal diastolic</i>	<i>High systolic High diastolic</i>
Cardio-vascular.....	0	32.1	67.9
Renal.....	31.8	12.7	55.5
Uræmics.....	20.6*	14.7	64.7

\*Figures indicate percentage incidence.

renal group 23.0. When the cardio-vascular group was further subdivided into those with and without albuminuria the latter group had the higher value. These were 28.0 and 32.0 respectively.

As the "factors" are correlated with blood pressure findings and albuminuria the results are very suggestive. These are recorded in Table 4. Again the cardio-vascular and renal groups are separated. In the cardio-vascular group without albuminuria with high systolic and normal diastolic pressures the average factor is 26.4. With high systolic and high diastolic pressures the average factor is 32.0. With albuminuria, high systolic, and high diastolic pressures, it is 31.6. In the interpretation of the factor in this group without albuminuria the effects of high systolic and normal diastolic pressures must be considered.

In the renal group even with normal systolic

and diastolic pressures the average value of the factor is lower than any of those noted in the non-albuminurias. In this group it is 24.4. With increased systolic and normal diastolic pressures it is 28.8. This it will be noted is slightly greater than that found in the cardio-vascular group without albuminuria. A possible explanation is that the increased blood supply to the kidney in the case of renal disease may enhance its concentrating power. With a high systolic and high diastolic pressure in the renal group the average value of the factor is the lowest of the whole series, namely 21.3.

Thirty-four cases of uræmia were studied and here again there appears to be corroborative evidence. There is a possible error to consider in the study of the uræmic group. Though in the other cases the clinical picture serves as a guide in classifying the cases, in far advanced disease this fails. The cerebral

manifestations in the terminal stages of cardio-vascular disease differ very little from uræmic manifestations in chronic nephritis. Occasional cases were noted in which the clinical diagnosis was definitely uræmia. In those cases the concentrations of urea in the blood were either normal or only slightly increased, and the values of the urea concentration factors were also either normal or slightly decreased. It would appear that these cases, fortunately too few in number to affect statistical results, belong to the cardio-vascular group. That they are not uræmic is strongly suggested by the results obtained with the diazo colour reaction test recently described by Andrewes<sup>9</sup> and Hewitt.<sup>10</sup> Our observations<sup>11</sup> corroborate the findings of these authors. In our series, to date, positive reactions have been found in all cases of chronic nephritis with marked urea retention in which the diagnosis of uræmia was confirmed by post mortem findings. A positive reaction has not yet been found in subjects the clinical signs of which led to the diagnosis of uremia, but in which the concentrations of urea in the blood were normal or only slightly increased. For this reason only those cases in which there was a marked urea retention were included in this group of uræmies.

The blood pressure findings in this series are of particular interest. The results are recorded in Table 5. In seven cases or 20.6 per cent of the series the blood pressures were normal. Of the remainder, in five cases (14.7 per cent) the systolic pressures were increased, but the diastolic pressures were normal. That all these normal blood pressures were not likely due to failing hearts in this extreme condition is suggested by comparison of the data with those obtained in the whole series. In the cardio-vascular group all subjects had an increase in systolic pressure, and 67.9 per cent had an increase in diastolic pressure. In the renal group only 68.2 per cent had an increase in blood pressure and 55.5 per cent had an increase in diastolic pressure. This incidence of normal blood pressures in the uræmic group was therefore not greater (in fact it was less) than that found in the renal group as a whole.

It will be noted that there is some parallelism between the incidence of high diastolic pressures (Table 5) and enlargement of hearts in both groups (Table 2).

The findings of renal efficiency tests may have occasionally been unreliable due to technical errors. Clinical findings may, in some instances, have been faulty especially as a guide in the proper grouping of the subjects. Diastolic blood pressure readings particularly may have been faulty. Statistical treatment of a large series of observations, however, excludes the effects of these errors. One of the theorems in biometrics is that the arithmetical mean of a series of observed values is the most probable value of the quantity measured. The above findings therefore appear to corroborate the view that in the cardio-vascular-renal complex we are dealing with two separate diseases. The division of the whole series of cases into the various groups and the evidence tending to support this view in practically every group makes it extremely unlikely that the findings are the result of chance.

In this paper I have attempted to demonstrate one of the possible applications of physiological methods. Whether other attempts result in success or not is a matter of further experiment. In such work, at least in my opinion, lies another value of renal efficiency tests.

I wish to gratefully acknowledge the assistance of Miss Eleanor V. Bazin, of the Department of Metabolism, who was responsible for the rather laborious task of the collection and orderly arrangement of the necessary data in preparation for statistical treatment.

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An Address

ON

THE CLASSIFICATION OF THE DIARRHEAS, WITH AN  
OUTLINE OF TREATMENT

BY R. D. RUDOLF, C.B.E., M.D. (ED.), F.R.C.P. (LOND.)

*Professor of Therapeutics, University of Toronto*

DEFÆCATION depends upon a sufficient bulk of intestinal contents reaching the lower portion of the large intestine, and upon a sufficient activity of the neuro-muscular apparatus concerned in the act. If either factor be much increased diarrhoea results.

Normally the contents of the small intestine are fluid, but when these reach the large bowel a rapid absorption of water takes place so that the residue that arrives at the lower part of the colon is more or less solid. Now, if anything increases the watery contents of the tube, or decreases its normal absorption, or if these contents are hurried on too quickly to allow of sufficient absorption, loose and probably too frequent stools occur.

Any irritation of the intestinal mucous membrane tends to increase secretion and also hastens peristalsis and so brings about diarrhoea.

Clinically it is usually easy from the symptoms to say in what part of the tract increased activity exists, and here the whole alimentary tube may conveniently be divided into three parts. The first consists of the stomach and the duodenum; the second of the small intestine and the upper portion of the large one; and the third of the lower colon and the rectum. When the overactivity is in the uppermost third of the tube the symptoms will be chiefly gastric, and consist of nausea, vomiting and epigastric distress or pain, with occasionally some diarrhoea. When there is colic, with occasional large well mixed stools, which are unaccompanied by any tenesmus, the diarrhoea is of the middle type; while if there is tenesmus, with scanty stools containing blood and much mucus it is of the lower bowel variety. The diarrhoea in typhoid fever is a good example of the second type while that in dysentery is due to inflammation in the third or lower bowel.

Of course it is not uncommon to find more than one portion of the tract involved, when the symptoms will be a combination of all of these. For example, after an excessive dose of croton oil there may be nausea and vomiting, with epigastric pain, colic with frequent large stools, and tenesmus with blood and mucus in the excreta. Such a generalized form is also seen in some of the cases of ptomaine poisoning, the irritant acting on the whole tract.

The many different forms of diarrhoea may be grouped etiologically into three great classes, and as the treatment depends very much upon the cause it is very necessary to try and properly classify a case before initiating any therapy. These three groups are:

1. Nervous,
2. Purgative,
3. Organic.

In the first class there is disturbed innervation of the alimentary tract, in the second some substance is present which is acting as a purgative, and in the third class a definite pathological change exists in the walls of the gut.

1. *Nervous Diarrhoea*.—Here there is no structural disease of the alimentary tract, but the nervous control is disturbed so that either secretion is increased or more commonly peristalsis is enhanced and thus the contents of the bowel are hurried on in a too fluid state. Anatomically considered, nervous diarrhoea is usually of the middle type although occasionally it exists in connection with the lower bowel in which case too frequent rather than too loose stools occur and as there is no lesion of the mucous membrane, tenesmus will not be present. Church diarrhoea, examination diarrhoea, and all those attacks that are induced by nervous strain belong to this group. Lienteric diarrhoea, where the bowels tend to

move whenever food is swallowed, is of the same class. We know that the entrance of food into the stomach normally tends to increase peristalsis of the whole tract, but usually this is not sufficient to cause any desire for defaecation; in certain nervous people the peristalsis becomes excessive and hence diarrhoea results.

The treatment of nervous diarrhoea does not consist in the administration of astringents or of opium, but rather in the use of nerve sedatives such as the bromides. The patient should be instructed to resist the desire to go to stool as much as possible, and in the slighter cases this often succeeds and soon the desire disappears, and each time that he thus conquers his bowel the next victory will be easier, as his confidence is strengthened, and the dread of the undesired stool occurring is largely the cause. Nervous diarrhoea is not usually accompanied by colic, but if this should be present the addition of belladonna to the bromide mixture will help to control this unpleasant symptom. In the lienteric form the meals should be small in bulk and be swallowed slowly and largely taken dry, and the patient should rest for a while after eating, as any exertion tends to increase the threatening peristalsis. In this type of diarrhoea undigested food often appears in the stools, chiefly because the contents of the tube have been hurried on too quickly, and thus the normal digestive juices have not had time to act sufficiently. Minim doses of *liquor arsenicalis* taken before meals seem sometimes in some obscure way to help in these cases.

**2. Purgative Diarrhoea.**—In this very common form of the trouble there is again no organic change in the bowel, but some substance has been swallowed, or has been elaborated in the stomach or bowel, which acts as a purgative. The type is usually that of the middle part of the gut; there is colic, and the stool is followed by complete relief until the next one threatens. The patient, so to speak, gets an enema from above. All the medicinal purgatives produce this form of diarrhoea, but also any food or drink that contains any mechanical or chemical irritant. Not uncommonly achylia seems to cause diarrhoea of this kind; the absence of hydrochloric acid from the gastric contents tending to produce an irritating chyme, which acts as an irritant when it reaches the small intestine. Bacterial decomposition of the con-

tents of the bowel may so act. A chill of the abdomen seems often to precipitate an attack as all those who have tropical experience well know. In India the natives are very careful to protect the abdomen from chills when they are sleeping in the open by wrapping the pugery, which guards the head from the sun in the daytime, round the waist. In acute cases the treatment consists in endeavouring to remove the irritant by the use of a purgative, and nothing here is so effective as a timely dose of castor oil, of which half an ounce is usually sufficient for an adult. This purgative tends to act on the bowel at a higher level than do others, and the action is followed by a sedative effect. If the attack be at all severe the patient is best in bed, and heat to the abdomen will lessen the colic. In urgent cases, like those often seen in the tropics, it is well to combine a small amount of tincture of opium with the castor oil, which lessens the colic, and also increases the after sedative effect. The diet at the same time should be cut down or even omitted entirely for a day or two and then restricted to boiled milk, and things made with boiled milk such as milk soups and puddings, all of which have an astringent action.

Usually, after the irritant has been got rid of by natural purging, or by catharsis produced by medication the diarrhoea will subside; if it does not do so it suggests that either the irritant continues to be present, as is the case in some of the achylie ones, and in chronic poisonings like that from mercury, or else some catarrh has resulted from the recent irritation and thus the case has drifted into the third class of organic diarrhoeas. For example, a large dose of croton oil acts first as a purgative and is thus got rid of but it leaves a catarrh which may persist long after its cause has gone.

**3. Organic Diarrhoea.**—Here some pathological change in the structure of the lining membrane of the bowel exists, and is the cause of the increased secretion and overactive peristalsis, that show themselves as diarrhoea. The flux may be of the middle bowel type as that of typhoid fever and most tuberculous cases, or of the lower form as seen in dysentery and in colitis. As regards treatment, rest and warmth and a restricted diet are even more important than in the purgative type. In a few instances such as the dysenteries, specific therapy is

available, but in most of the other cases our treatment is limited to the relief of symptoms.

The use of purgatives in this type of diarrhoea is subject to great restrictions. Although more bacterial contents may be got rid of by this means than by any other there is always the danger of further damaging the diseased mucous membrane. In mild cases of catarrh minute doses of calomel (say, 1/10 grain every fifteen minutes for five doses) followed by a couple of drachms of castor oil may with advantage be given, but in cases of doubt it is well to guard the oil with some laudanum or other opiate. It must be remembered that the infection is now largely lodged in the tissues of the mucous membrane and hence is beyond the reach of any purgative.

When the trouble is of the common middle bowel type bismuth, chalk, astringents, and opium are chiefly used. Bismuth and chalk act chiefly as protectives, tannic acid and gallic acid as astringents, and opium as a checker both of secretion and of peristalsis. A useful mixture is the following:

B	
Bismuth. carb.	3ii
Pulv. Tragacanth. Co.	3i
Mist. Cretae.	ad 3vi

Sig. A tablespoonful as often as required.

The patient is told to take a dose every time that he has a loose stool. If the case be at all severe some opium may with advantage be added to the mixture; say 10 to 20 minimis of paregoric for each dose.

In acute watery diarrhoea kaolin is valuable, and may be given *ad libitum*. It has been found useful even in Asiatic cholera and acts as a protective and also as an adsorbent of the bacterial toxins. It has been so used in China for ages.

In more chronic cases, tannic acid in the form of tincture of catechu or of kino, or gallic acid, may be used but the last is superfluous and has now been dropped from the *British Pharmacopæia*. The tannic acid may well be given as tannalbin or tannigen in which the acid is combined with albumen and is set free in the bowel. Acetate of lead is often used as an astringent, but its action is somewhat uncertain. It occurs in the well known pill of lead and opium but this valuable preparation, so

much used in the tropics, owes its action chiefly to its opium content.

Intestinal antiseptics are often used in the chronic diarrhoeas and they seem occasionally to be of some value in lessening the flux and also perhaps especially in lessening any undue odour. All the same, when one remembers that the bulk of the normal faeces consists of bacteria which have played an important rôle in the digestion, it is hard to believe that any antiseptic will kill out undesirable germs and leave untouched those that are useful. It would almost seem like firing a charge of buck shot into a flock of sheep in the hopes of killing some wolves that are preying upon the group. It has been claimed that certain antiseptics kill out streptococci and yet leave the colon bacillus unharmed, but although this may be done *in vitro*, it is far from proving that the same thing occurs when they are given by the mouth. Recent work by L. P. Garrod (*Brit. Med. Jour.*, Feb. 27, 1926, page 367) tends to throw great doubt upon such antiseptics. He has found that such antiseptics "when given by the mouth, do not appreciably reduce the total number of living aerobic organisms in the faeces." But, as mentioned, there is some clinical evidence that these antiseptics have some action and in a case that is hanging fire they may be tried. Salol and beta-naphthol are usually employed, each in the dose of five to ten grains several times daily, and mercury in the form of minute doses of calomel, as already referred to, is often used and has the advantage of also being a laxative, and hence tends to mechanically remove the offending bacteria. In the last few years dimol has been much pushed. It is said to be thirty-five times as toxic to the typhoid bacillus as phenol and yet to be non-toxic to the host. It is given in doses of 2 to 4 grains several times daily.

Where the diarrhoea is of the lower bowel type all the above treatment may be of value, but we can more directly reach the affected area from below and hence antiseptic, soothing or astringent douches are frequently used. In the chronic forms of this lower type of diarrhoea no diagnosis should be considered as complete until a rectal examination has been made to exclude if possible local trouble, such as an impacted faecal mass, or a new growth which may now be amenable to operation, and yet if

missed, may soon be beyond this, much to the discredit of the practitioner.

In urgent tenesmus the great value of the *enema opii*, which consists of 20 to 30 minimis of laudanum in four ounces of starch solution, cannot be too strongly urged. When the case is a little less acute the simple *enema amyli* will often suffice. Douches usually consist of warm saline solution, followed by 1 per cent creolin or 2 per cent boracic solution. Where the catarrh is chronic, astringents are often employed, such as a 1 per cent solution of zinc sulphate or acetate of lead, or silver nitrate,  $\frac{1}{4}$  to 1 grain to the ounce.

When the diseased surface is high in the lower bowel a so-called high enema is often used, but it is well to remember that it is unnecessary to attempt to introduce a long tube into the bowel with the idea of its going high as it usually merely curls up in the rectum. It is never necessary to insert more than four inches of tubing, but with the patient in the Sims or left lateral position fluid gently passed in under a pressure of one to two feet will easily reach the cæcum.

In very chronic cases of lower diarrhoea the condition may only yield to appendicostomy when the whole colon may be irrigated from above, often with happy results.

Mucous colitis sometimes causes a diarrhoea of the lower type, attacks of this often alternating with constipation. This peculiar condition, which must be carefully differentiated from catarrhal or other forms of organic diarrhoea, is not an inflammation of the mucous membrane at all, but rather a nervous condition in which excessive mucus is excreted and tends to form strings or strips or even false membranes, which sometimes

form tubular casts of the bowel, and are passed with straining and pain. It is a state calling for general nervous treatment rather than local. The latter is only too apt to fix the patient's mind on the bowel, and he tends to become hypochondriac. The question of diet is here unsettled; the French advise a bland and unirritating one, while the Germans use the very opposite. When two such opposite diets seem to produce good results the deduction is that neither has much effect. When constipation exists castor oil or mineral oil are useful, and during the diarrhoea bland douches with normal saline or sodium bicarbonate help to detach the mucus. These patients are often benefitted by a stay at certain spas such as Harrogate and Plombières.

#### Summary

Diarrhoeas may be anatomically classed as high, middle or lower, depending upon the portion of the tract that is at fault. Etiologically considered diarrhoeas may be classed as nervous, purgative or organic. The treatment of the nervous type consists chiefly of psychic therapy, with the use of nerve sedatives; the treatment of the purgative type by medicinal purgatives to get rid of the irritating contents of the bowel that are the cause of the trouble. The medicinal treatment of the organic forms is likely to be more difficult and consists in the use of protectives and astringents and often of opium in some form. When the condition is in the lowest portion of the tract much of the therapy is best conducted from below.

The treatment of mucous colitis is chiefly that of the general nervous condition although local therapy has its place.

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**Study of Nine Hundred and Eighty-Four Deaths in the Puerperal State in Massachusetts.**—Susan M. Coffin, Mary F. DeKruif, Mabel A. Southard and Angeline D. Hamblen, Boston, give the results of a study of all the deaths (984) occurring in Massachusetts during the years 1922 and 1923 among women six months or more pregnant, from causes immediately related to pregnancy or childbirth, or from causes in which pregnancy or child birth was a controlling factor. Deaths occurring during the

puerperal state from certain complications, such as heart disease, acute infections and a miscellaneous group, are included. Septicemia, toxæmia and hemorrhage, causes of death which may be called generally preventable, were responsible for 58 per cent of the deaths. In 591 cases, operative procedures figured. Lack of adequate prenatal care was evident in 89 per cent of the cases.—*Jour. Am. Med. Ass.*, Feb. 6, 1926.

## An Address

ON

### THE MEDICAL ASPECTS OF DISEASES OF THE LARGE BOWEL

By A. H. GORDON, M.D.

*Montreal*

THE numerous diseases of the large bowel seen by the physician to-day appear to divide themselves into two classes. The first includes the diseases in which medicine is helpless and the duty of the physician is to pass such promptly to the surgeon for such relief as can be given. The second group includes those cases of which the treatment is regarded as still within the province of medical therapy. A cynic might add a third group in which the physician's help is sought to ameliorate the condition of those who have been already cured by operative means.

In the old days all diseases of the bowels were medical diseases, and as such were left to physic and to fate, and one was as bad as the other; later, the surgeon peeped cautiously into the belly and nipped off the appendix, and getting bolder as his mortality dropped to two figures, he sewed up holes that had opened in the walls of the gut, to the great benefit of those who got better. And then he cut out tumours, and finally as the going got safer, he decided that the big bowel was a sewer, and the root of all evil, and on the basis of this new pathology he dismembered the people right and left—but not much left, and having done this to the people who were otherwise well, it seemed good to do it to those who had tuberculosis and were not thriving, so it was done to them also, but it isn't done now quite as much as it was.

What I am coming to, is the fact that to-day there is no such thing as the strictly medical aspect of diseases of the large bowel.

One might then ask himself, if he were a strictly medical person, "What kinds of troubles in the large bowel may I become legitimately interested in?" Obviously it is of no advantage to get excited about appendicitis or intestinal obstruction, or tumours of

the bowel, for these are surgical from the drop of the hat, and having seen them once, or twice at most, we should play the part of traffic officers and get them as quickly as may be to a surgeon. But there are other troubles over which we may linger longer—such things as the various kinds of inflammation of the lining of the colon, tuberculous, syphilitic, dysenteric and typhoidal; the defects in function, motility and secretion, and the congenital abnormalities which are non-surgical.

*Tuberculous disease* of the large bowel has in the last few years become a much more active subject than ever before. In former times looked upon as one of the last steps toward the inevitable, it has through the labours of Archibald, Pirie, Brown and Sampson, Carman, Stewart and others become a reasonable subject for diagnosis, while still in a stage where treatment is of avail, and the treatment itself offers a reasonable hope of success. The diagnosis is not to be withheld until nausea, vomiting, pain, tenderness, diarrhoea and emaciation have compelled it; but in a patient with pulmonary tuberculosis, presenting symptoms of marked nervousness, discomfort after meals, failure to gain weight under suitable conditions, or a general "not being well" when no other cause is found, with some abnormality of appetite, and crampy abdominal pains aggravated by food and relieved by abstinence, and this persisting from day to day, one may reasonably suspect tuberculosis of the bowel.

The commonest site is the ileo-caecal region where the incidence is somewhat less than 50 per cent, declining toward the two extremities of the digestive tube to 13 per cent in the rectum, and 3 per cent in the duodenum. It is in the cæcum and more proximal portions of the colon that the x-ray evidence first pointed out by Archibald and Pirie is most available.

This consists in the main of a persistent refusal of the barium to show itself in the areas involved, especially in the cæcum, while often evincing a tendency to be held in the lower coils of the ileum.

Stewart of Ninette states that in 560 cases of pulmonary tuberculosis, many of which were advanced cases, 209 were suspected of intestinal disease; in 103 or 18 per cent of the whole, diagnosis of intestinal tuberculosis was definitely made on the basis of the history and röntgen ray evidence. A certain number of cases thus diagnosed have been submitted to more or less radical operation, but since the advent of ultra violet light therapy there has been a swaying of the pendulum away from this more extreme measure. In a total of seventy-six cases of pulmonary and intestinal tuberculosis treated by ultra violet rays Brown and Sampson reported that thirty-three had been distinctly improved. They speak also with encouragement of the use of x-rays in another group of cases.

There is, however, another type of tuberculosis of the large bowel which is worthy of notice; that is the hyperplastic or fibroid type, and the difficulty of the diagnosis of such from tumour formation may be illustrated by the following case:

A woman of sixty-five, a very pale, miserable looking person had suffered from indigestion with some abdominal pain since the age of thirteen; this pain in the last few months had become much more severe. She had frequent attacks of nausea, pain and occasional diarrhoea and had lost much weight. There was an indefinite mass in the region of the cæcum and another in the right upper quadrant; the barium meal left a persisting stain in the cæcum, and the barium enema showed definite arrest just distal to the hepatic flexure. There was no blood in the stool but a diagnosis of scirrhous carcinoma of the transverse colon was made on the basis of the physical and the x-ray examination.

On opening the abdomen two tumours as large as small oranges were found in the large bowel, one above the cæcum, the other distal to the hepatic flexure. They had to the naked eye all appearances of cancer, though two seemed one too many. Dr. Bazin excised the proximal third of the bowel with the tumours, and on examination they were found to be not cancer but tuberculoma. In this instance the long duration of the symptoms which had been thought to be only a background for the recent tumour phenomena, was in fact a part and parcel of the history of her tubercle.

Though we are here well out of the tropics, we not infrequently chance upon examples of dysentery of one form or another, mainly of the bacillary type and a number of epidemics have occurred, one at a railway junction not far from Montreal where a summer camp had been

established; in a number of the chronic diarrhoeas found in the district this disease may be the cause. The characteristic lesion of dysentery is the necrosis, and the characteristic finding in the stool is at some time mucus with blood. The etiological diagnosis may require considerable pursuit.

An *ulcerative colitis* may be due to a *B. coli* or to *B. aerogenus capsulatus* or to an enterococcus, as well as to various strains of the dysentery bacillus and to the entamœba. Sigmoidoscopy will prove the presence or absence of ulceration, and culture of the stool may show the organism, but a number of organisms may be present, when recourse may be had to intra-cutaneous inoculation of 1/100 c.c. of 1 per cent suspension of killed bacteria. Or again the patient's serum may be tested for the agglutination of the suspected organism.

Willmore and Shearman have pointed out that the mucus in the stool has a fairly definite microscopical appearance. In the bacillary form showing an abundant polymorphonuclear leucocytosis, while in the amoebic type the leucocytes are scant and the red cells show a tendency to gather in groups.

Serotherapy is of value in bacillary dysentery if employed very early, but the later sequelæ of dysentery are the disabling features and are not subject to relief by serum. A prolonged and tedious dietary regime is necessary if the primary infection is not early controlled.

The colonic manifestations of *syphilis* though rare, are crippling and dangerous, and consist chiefly in rings and bands of fibrosis leading to stricture with chronic obstruction. I well remember a patient whom I allowed to slip through my hands unrecognized until the autopsy, although he had a triple plus blood Wassermann reaction which I regarded as an incidental finding.

After we dispose of the visible and tangible diseases of the large bowel we are confronted with the nebulous something known as *mucous colitis*. It seems to occur most often in women, and abdominal cramps with the passing of a large amount of mucus are the main features of it. But it is the person who has the ailment that is the diagnostic feature. A lack of mental control and an undisciplined and usually inconsequent personality have been in my experience the characteristics of the type of person who

presents these phenomena. That it has anything whatever to do with disease of the colon I gravely doubt, any more than has belching of gas ordinarily anything to do with disease of the stomach. And for the same reason local treatment of the bowel seems very much out of place. Rather should one if possible endeavour to explain the probable central causation of the ailment and endeavour to build up what is possible through re-education of a usually unstable nervous mechanism.

*Intestinal stasis* is one of those subjects on which it seems necessary to be a partisan, and when I quote the following from Sir Arbuthnot Lane, the foremost exponent of the doctrine, you may guess my feelings in the matter.

"The next series of changes we have to consider comes about by the absorption from the infected contents of the gastro-intestinal tract of more toxins than the liver is able to deal with.... These noxious substances produce disastrous results.... The degenerative changes in the thyroid, adrenal and other ductless glands, the heart and blood vessels, the nervous system, the eyes, the ears, kidneys, liver, pancreas, uterus, ovaries, testes, prostate, breast, fat, skin, hair, lymphatic tissue and gums and teeth I have frequently described in detail, and I have shown how liable are certain of these degenerated organs as the breast, uterus, ovary and pancreas to be infected with cancer. Among the nervous symptoms may be mentioned intense headaches, neuritis, neuralgia, sleeplessness, misery, complete mental and physical prostration, melancholia, epilepsy, disseminated sclerosis, delusions, paralysis, agitans, dementia praecox."

These things may all be so, but I know of no proof that they are so, and if I were asked for my own credo in the matter it would be that to label any case without demonstrable organic disease as one of "intestinal stasis" is another way of saying "not yet diagnosed."

That intestinal stasis does occur is undoubtedly true and it is recognized in such conditions as megacolon or Hirschsprung's disease, but these are associated with a definite pathology of the wall of the gut, congenital or acquired. But when one sees the methodical manner in which a colon will empty itself in an abdomen plastered by tuberculous peritonitis, or by other forms of abdominal adhesions, it is hard to

realize that the odd kink from slender bands from a mesentery is going to stop the muscle of an intestine in the pursuit of its duty. Much more rational would appear the view of Sir Arthur Keith that slowness of movement of the wall of the gut is a matter of its intrinsic and extrinsic nervous mechanisms.

As a matter of fact also, no chemical proof has ever been offered that from a so called torpid bowel, any toxic substances are absorbed which are the efficient cause of any of the diseases named above. One may refer in Montreal to Dr. Little's clinic at the Montreal Maternity where postpartum patients are allowed to go a week without a bowel movement, and so far as I know, no discomfort or damage results. As a matter of fact, in people with so called colonic stasis the symptoms are more often a result of the purgatives administered than of the stasis itself. One may naturally say—see how much better one feels after a sufficient bowel movement; surely some poisonous element must have been removed. But does it ever occur to us to remark how much more comfortable one also feels after the bladder is emptied? It is not that necessarily any toxic element has been removed, but that a bulky material has been lifted off, and in addition there is the sense of well being, engendered by a consciousness of duty well done.

Of all the forms of drug addiction perhaps none has given so much unhappiness and mental and physical disturbance as the addiction to purgatives. They have introduced a discord into the reflex by which the bowel is normally emptied, and eventually have compelled the neuromuscular mechanism to react to this irritation and to this alone, and it's a long road and a hard one which the addict must travel to regain his former normal mechanism. And in addition, a mental complex has been formed around the delusion, that a purgative and nothing but a purgative will cause a bowel movement.

With those whose mental attitude has not been completely warped, explanation of the mechanism of defaecation—the element of voluntary attention, of the integrity of the gastro-intestinal tube, and the efficiency of physical stimulation by food, will usually suffice to restore the normal response. But these therapeutic measures are only of avail

after careful observation has proved that the constipation has only medical and not surgical aspects.

(Part of a symposium upon diseases of the large intestine. Montreal Medico-Chirurgical Society.)

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## DIFFERENTIAL DIAGNOSIS OF UPPER GASTRO-INTESTINAL LESIONS

BY ROSCOE R. GRAHAM, M.B.

*Toronto*

IN discussing the differential diagnoses of the upper gastro-intestinal lesions, two facts should be recognized—first, that such lesions, almost universally referred to by patients as "stomach trouble", show an organic lesion in the stomach in less than ten per cent of instances in which that organ is blamed for the discomfort: second, that upper abdominal symptoms may be the result of either a functional or an organic lesion. A diagnosis must be reached only after eliciting all the various symptoms present, and interpreting them in the light of normal physiological processes. One must remember that functional indigestion is extremely rare, and rather than make a diagnosis of nervous indigestion of unknown origin, it should be confessed that a diagnosis cannot be made, and the aid of a colleague should be sought. In this connection migraine, a disease of unknown origin, should be mentioned. Migraine is that peculiar gastro-intestinal disturbance which follows a sudden severe localized headache, and is often accompanied by visual aura. Such upper abdominal distress is characterized by most extreme nausea, followed by vomiting, the patient feeling perfectly fit after one or two hours' sleep. A large percentage of these patients have constipation, and some tenderness in the right iliac fossa. Because of this, it is often assumed that a diseased appendix may be the reflex cause. Migraine is merely mentioned in order to condemn most strongly any surgical procedure directed towards its relief. Probably there is no disease with gastro-intestinal symptoms which has given more lamentable results following surgical procedures for its attempted cure.

What is really meant by functional or nervous indigestion? Is it not an alteration in the normal co-ordination between the various physiological processes which are taking place in the upper gastro-intestinal tract? There are only two processes—secretory and neuro-muscular. One must remember that as a result of a true organic disease in other portions of the gastro-intestinal tract, there are altered secretions and altered neuro-muscular activity in the stomach. Such alterations are glibly spoken of as reflex phenomena, and might justly be termed nervous indigestion. Only in patients with an abnormal neuro-muscular activity, is the diagnosis of nervous indigestion logical. In the past an organic disease has been considered solely as a clinical entity. It should be considered also in association with the individual patient, taking into consideration his environment and economic position so far as worry and over-work are concerned. The failure to take this comprehensive view of the case has led to very poor end results, and a very imperfect appreciation of disease processes. In other words, in no type of disease can psychology be applied in practice to such advantage as in those patients suffering from chronic gastro-intestinal disorders.

In the minds of the laity, upper abdominal distress means stomach trouble, and too often in the minds of the profession it means indigestion, without any attempt to determine a local or remote cause. With the experience of innumerable upper abdominal laparotomies, and the invaluable aid which x-ray has given in the elucidation of upper abdominal disease, it is now demonstrated that a multitudinous

number of lesions may be situated in this area. It would at first seem an almost hopeless task to differentiate clinically the various lesions which may arise in this portion of the intestinal tract. However, if we admit that all pathological lesions produce symptoms as a result of an alteration in the normal phenomena, then at least we have a possibility of reaching a diagnosis. Such pathological lesions can only alter two things—first, the secretion; second, the motion. Motion may be interfered with by two main causes—first, obstruction; second, imperfect muscular contractions resulting in rapid emptying in the hypertonic musculature, or delayed emptying in the atonic musculature. Obstruction may be due to an organic lesion, such as a scar constricting the lumen of some portion of the tract, or to spasm of the musculature.

The acute processes in the upper abdomen form a subject too comprehensive to be considered in conjunction with chronic upper abdominal lesions. One can only here emphasize the importance of appreciating the association of pain and tenderness in true intraperitoneal inflammatory lesions, as opposed to the dissociation of pain and tenderness in extraperitoneal lesions simulating true intraperitoneal disease. The association of pain and tenderness, the former aggravated by change of position of the patient, is in itself, in the vast majority of cases, sufficient justification for advising a laparotomy in a patient acutely ill.

The diagnosis of chronic lesions must therefore be arrived at by interpreting symptoms as due to altered motion and altered secretion. There is additional aid in what might be termed a characteristic life history of a disease. We know that if the altered motion is the result of a mechanical obstruction due to a scar or extrinsic bands, then the disability of the patient must be continuous, without any remission, which amounts to complete freedom from all symptoms; whereas if the altered motion be the result of a recurring type of organic lesion, then the disease process is characterized by attacks of ill-health or indigestion, with periods of absolute freedom from any disability. This necessitates a careful, painstaking life history of the patient's gastro-intestinal metabolism, with accurate note of even minor upsets, which may have to be

elicited by leading questions, particularly if the patient has been a chronic sufferer from gastro-intestinal disturbance, an acute exacerbation of which makes medical advice essential for the first time. In such a patient, gastro-intestinal distress, which the normal, healthy individual would consider very serious and severe, has become so commonplace that it has been disregarded.

Let us consider the diagnostic value of gastric analysis. Before determining what is abnormal, one must know what is normal. For many years the profession has used the classical Ewald test meal, and has found results so at variance with each other, that no definite interpretation could be made. Rehfuss is responsible for the present method of gastric analysis by means of the fractional test meal. The result of his investigations during the last eleven years has shown that the supposed pathological findings in the analysis of the classical Ewald meal can be duplicated in health, depending upon the stage of the digestive cycle at which the content is withdrawn. It has been proven repeatedly that patients may be suffering from symptoms which have long been called hyperacidity, and yet on analysis of the gastric content, no free hydrochloric acid is present; yet such patients experience sudden and prompt relief by the ingestion of baking soda. Thus our fancied explanation of increased acidity being the cause of symptoms is shattered. Also, in view of the inconstancy of the chemical analysis in various types of disease, one can place very little reliance upon this procedure from a diagnostic standpoint. It is often stated that in definite upper abdominal disease, the absence of hydrochloric acid denotes gastric carcinoma, yet how often do we find such an analysis in patients ultimately proven to be suffering from cholecystitis?

One is forced to the conclusion that irregularities in normal gastro-intestinal motion are the cause of symptoms in the gastro-intestinal tract. The fundamental principles governing gastro-intestinal motion in health must be emphasized. The most important one is that relaxation precedes contraction. Contraction of a hollow organ controlled by a sphincter has a contrary innervation, as proven by Meltzer, and exemplified by the relaxation of

the sphincter of Oddi when the gallbladder contracts. Hence muscle spasm will upset this normal condition by preventing relaxation from preceding contraction. Furthermore, because of this fundamental law of relaxation preceding contraction, there is maintained a constant normal rate of flow through the gastro-intestinal tract. At the end of six hours, in health, the stomach is empty; from forty to eighty per cent of the content has reached the cæcum, with the balance in the terminal ileum. In about three-quarters of an hour after the ingestion of food, the bile in the gallbladder has found its way into the duodenum, and the further flow of bile is direct from the liver itself.

In view of these fundamental principles, one must stress again the importance of determining the continuity of a gastro-intestinal disability. In the upper abdomen there is only one disease which constantly causes recurring attacks of indigestion or dyspepsia, with intervals of absolute relief from any consciousness of stomach trouble, namely duodenal ulcer. Gastric ulcer on the other hand, may allow periods of wellbeing between attacks of indigestion, but, as shown later, this is not constantly so. Gallbladder disease shows a continuous disability because of a continuous pathological lesion, which is incapable of spontaneous recovery. Again let it be emphasized, it is difficult to determine in a patient forty years of age, a continuous gastro-intestinal upset, because such a patient has suffered so long that he fails to recall the minor disabilities.

The most common cause of irregular motion in the proximal portion of the tract is muscle spasm. This muscle spasm may occur anywhere in the tract, including the sphincters. Obstruction due to spasm or other cause in the proximal portion of the tract, will cause symptoms closely related to the ingestion of food. Obstruction due to spasm or other causes lower down in the tract will cause symptoms with a definite cycle in relation to the time of day. By reason of the variation in the exciting cause, there will be variation in the degree of spasm and in the degree of discomfort. In considering the disease from the earliest manifestation of indigestion, one should therefore be able to elicit a typical

history of such irregularities quite in accord with the etiological process.

We speak very casually of symptoms. What causes symptoms? Symptoms are the result of abnormal physiological processes. If the time and manner of occurrence of symptoms is to aid us in correctly interpreting these processes, the following symptoms must be considered especially significant:—lack of hunger, excessive hunger, burning, belching, pyrosis, nausea and vomiting, distress, pain. We first have to determine what normal process creates hunger. Carlson has proven that hunger is appreciated when the stomach is in a state of normal tonic contraction. Therefore if a patient is never hungry, then such patient's stomach is incapable of normal tonic contraction. This condition of the stomach may be the result of a visceroptosis, a general muscular atonicity, or a dilatation of the stomach resulting from an obstruction at its outlet. The diagnosis of an atonic stomach can be proven very readily by having the patient drink the two halves of a seidlitz powder separately, as a result of which the stomach will be distended, making its outline visible. This simple procedure provides food for thought, because the patient with an atonic stomach is absolutely free from discomfort, yet were we to give the two halves of the powder separately to a healthy individual, he would immediately complain of distress or pain, and belch, or have a regurgitation of fluid in the mouth, or even vomit. The only difference between the two individuals lies in the ability of the gastric musculature to contract. Therefore pain results because of increased intra-gastric tension in an organ capable of normal tonic contraction, and the belching or pyrosis or nausea are indicators of the degree and duration of such increased tension.

What, then, is the explanation of gastric pain in disease such as cholecystitis or ulcer? In other words, what causes an increased intra-gastric tension? This is believed to be due to a spasm of a segment of the gut which does not relax during normal peristalsis, thus producing increased intra-gastric tension in a portion of the stomach. On the other hand, instead of spasm we may have a definite organic obstruction, and the degree and duration of the obstruction, whether it be spastic

or organic, will determine whether the patient will have distress, with belching, pyrosis, nausea or vomiting, because all are stages of the same fundamental physiological upset.

If our earlier statement be true that less than ten per cent of individuals complaining of stomach trouble are suffering from a definite intrinsic organic lesion in the stomach, what is the explanation of the almost constantly associated stomach symptoms when the lesion is elsewhere in the upper abdomen? This can be explained only by appreciating the fact that our gastro-intestinal tract has a dual nerve supply, the major portion of the coarse muscular movements being controlled by the vagus, but the pyloric sphincter and the sphincter of Oddi controlled by the sympathetic system, and in the light of recent investigation, we must believe that the sympathetic system is a very real factor in maintaining normal tone. Thus we realize that lesions of the biliary tract must have a close co-ordination with the physiological processes in the stomach, because this structure arises from a somatic area closely associated with that from which the stomach is derived, and thus both have a common sympathetic innervation. It is then not hard to realize that disease in the biliary tract will upset normal motion in the stomach. This alteration in gastric motion is shown by repeated x-ray examinations, to manifest itself by a mid-gastric spasm in a large percentage of cases. Also, lesions situated in the duodenum, by virtue of the close embryological origin, upset normal gastric motion, and produce hyper-peristalsis in the stomach itself. This explains why two most common remote lesions give rise to abnormal motion in the stomach, without any disease process being present in this latter organ itself, and also why a diseased gallbladder which is incapable of spontaneous recovery, produces continuous stomach trouble. A duodenal ulcer, on the contrary, becomes quiescent and covered with mucous membrane, during which time there is no exciting cause, with consequent absolute freedom from symptoms, thus accounting for the characteristic periodicity in the gastric distress.

In addition to this reflex motor phenomenon, spastic and organic obstruction result from intrinsic lesions. For instance, in duodenal

ulcer there is definite spasm in the segment of duodenum in which the ulcer lies. Similarly such a spasm occurs in the segment of stomach in which an ulcer is situated. Both of these ulcers, if undetected and untreated, will progress to the formation of dense scar tissue, which will result in a definite organic obstruction.

Therefore in a broad way, a clinical diagnosis must locate the lesion in one of three areas—the stomach, the duodenum, or the biliary tract. In lesions situated in the stomach, we are attempting probably the most difficult of all clinical diagnoses in the upper abdomen. As previously mentioned, the occurrence of one of two things will give us a clue upon which to base our diagnosis—altered motion, or altered chemistry, in relationship to, the ingestion of food, to the time of day, and to the life history of the disease. In lesions in the stomach, both phenomena occur. Let us at the outset discard the chemical analysis of the gastric content as being of any real value in the diagnosis. We have as possibilities only a spastic or an organic obstruction. A fact which most of us fail to realize is that the variation in the site, extent and character of the ulceration determines the degree of obstruction. The site is probably more important than is generally realized. On more than one occasion, in routine x-ray examination an ulcer has been accidentally found lying in the lesser curvature high up near the cardia, having caused no clinical symptoms to indicate its presence. This is due to the fact that the neuro-muscular reaction at the cardiac end of the stomach is not nearly so sensitive as it is at the pyloric end. On the other hand, we must not forget that the vast majority of the ulcers occurring in the stomach are found in the pyloric antrum situated either in the lesser curvature or in the posterior wall; rarely on the greater curvature. Such ulcerative processes are found pathologically to vary all the way from a simple localized ulceration of the mucous membrane, to ulcers which have penetrated all the coats of the stomach, even involving contiguous structures in a subacute inflammatory process. Such diverse pathological findings must result in equally diverse effects on the neuro-muscular activity of the stomach itself. For instance, with an ulcer

which has penetrated all the coats of the stomach, there is no longer any gastric spasm, but there is a subacute inflammatory reaction about the ulcer, giving a marked perigastric inflammatory mass. These variations of the pathological process explain the varied symptoms in gastric ulcer. In the early stages of a gastric ulcer near the pylorus, the symptoms are directly associated with the intake of food, the following being a fairly definite sequence of events: food—comfort—pain—comfort; as distinguished from duodenal ulcer, which will be discussed later, in which there is a triple rhythm of food—comfort—pain, the latter persisting until food is again taken (Moynihan). Thus we see that the essential difference between a non-penetrating ulcer in the stomach and a similar ulcer in the duodenum, is that in the gastric ulcer the patient is comfortable prior to the taking of food, whereas in the duodenal ulcer he has discomfort. A further differentiation lies in the fact that the periodicity of the distress in duodenal ulcer is very definite and characteristic, whereas the symptoms in gastric ulcer are very bizarre and irregular. The variable symptomatology of a gastric ulcer is confused by the fact that before the ulcer has completely penetrated all the coats of the stomach, there is produced a perigastric inflammatory reaction, resulting in continuous pain or discomfort, which may be superimposed upon or replace symptoms which had previously been associated solely with the ingestion of food. One important clinical finding is that the patient with an ulcer having an associated perigastric inflammation, often experiences marked relief from the distress when lying down, with immediate recurrence of distress upon standing. This applies equally to duodenal ulcers (Goldie). Ulcer occurring for the first time after fifty years of age is nearly always malignant, and after sixty, in my experience, is invariably so.

Unfortunately in gastric carcinoma there is not the early alteration in normal motion evidenced by spasm, which is typical of ulcer. Therefore carcinoma can produce symptoms only when it is large enough to cause organic obstruction. This progress is so insidious that the first abnormal physiological factor will be an imperfect emptying of the stomach because dilatation of the musculature renders it incap-

able of normal tonic contraction, with the resultant clinical symptom of loss of appetite. As there is no spasm in the involved area, there is no pain. It can readily be realized that loss of appetite will not occur until the carcinoma has reached considerable proportions, and unless the lesion be situated in the pylorus, which can be obstructed by a small volume of growth, the patient will never seek medical advice until the lesion is inoperable. In other words, one will rarely if ever see an operable mid-gastric carcinoma. Therefore it behooves us to suspect as possibly suffering from carcinoma, all patients of middle life who have a continuously failing appetite, when previously they had enjoyed their meals. There is no remission of symptoms in carcinoma of the stomach. An accompanying symptom of this loss of appetite will be a loss of energy, with some loss of weight, which the patients as a rule ascribe to their age, and think is a natural development of their time of life. Only by suspecting carcinoma with such a history, will it be possible to establish the diagnosis sufficiently early to secure a cure by radical removal.

In the duodenum, as well as ulcer, there may be duodenal ileus, i.e. a dilatation due to duodenal obstruction from extrinsic causes. In duodenal ulcer we have probably one of the clearest-cut clinical pictures in upper abdominal disease. It is one of the few lesions in the abdomen characterized by periodic attacks of distress, followed by periods of absolute comfort. No other intra-abdominal disease, except recurring acute appendicitis, will give such marked distress, followed by such complete freedom from discomfort over so long a period of years. The first attack of indigestion due to duodenal ulcer may have occurred twenty, thirty, even forty years prior to the patient seeking relief, but there will be that history of absolute wellbeing, followed by distress for varying periods. Therefore one must not fail to realize that the individual may be driven to seek relief because of organic obstruction, and the change of history and the change of symptoms may obscure the diagnosis, if the life history of the particular patient's indigestion is disregarded. Obviously the immediate complaint and history of such a patient will be that of a pure obstruction,

which might be mistaken for carcinoma were it not for the long history of recurring attacks of indigestion. As a result of repeated x-ray examinations of patients suffering from duodenal ulcer, it has been found that in about one to two hours following the ingestion of a meal there is increased gastric peristalsis, with often delayed emptying, and hence increased intra-gastric tension, which explains the pain. The intake of food at this time alters this hyper-peristalsis, thus the relief from the hunger pain.

One often notes clinically, in eliciting a history, a very definite series of symptoms characterized by remissions, and the triple rhythm of comfort following food, which in turn is followed by pain, the latter persisting until food is again taken. These symptoms recur over a period of years, till finally the patient suffers from an attack characterized by pain or distress, which is not followed by the customary relief. There are two interpretations of this alteration. One is the development of an associated gastric ulcer, and the other, which is much more common, that an ulcer which has penetrated all the coats of the duodenum, has involved peri-duodenal structures in an inflammatory reaction. The most commonly involved structures are the gallbladder and the gastro-hepatic omentum. Such a change of symptoms in a patient suffering from duodenal ulcer indicates a pathological lesion which diet will rarely relieve.

In contradistinction, duodenal ileus may be due to one of two factors, either the pull of the superior mesenteric artery across the third portion of the duodenum, or to an exaggerated ligament of Treitz. The great difference in the symptomatology of these two causes of duodenal distress is that when the ligament of Treitz is the cause, the duodenal symptoms are constant and progressive, following very closely the ulcer syndrome, but lacking their periodicity. In the instance where the duodenum is dilated because of the pull of the superior mesenteric artery, there is an associated lesion in the right iliac fossa, characterized by a mobile cæcum, and the fact that the symptoms have gradually developed in an individual who has never been particularly well for a long period of years. The obstruction of the duodenum is dependent

upon the pelvic position of the cæcum, which drags on the superior mesenteric artery through the right colic branch; hence when the mobile cæcum is loaded, and lying down in the true pelvis there is marked obstruction. This obstruction is varied by the position of the cæcum, which in turn is varied by the position of the patient. Thus we will have the symptoms changing in severity from day to day, and during different times in the same day. In other words, they are not consistently worse in the morning and better at night, or vice versa. They follow no set rule; are not dependent upon the ingestion of food. This bizarre characteristic of the distress is of the greatest value in the diagnosis of duodenal ileus resulting from a superior mesenteric obstruction. This diagnosis may be confirmed radiologically. If the superior mesenteric artery is responsible for the obstruction, the dilatation of the duodenum will cease at a point corresponding to the middle of the bodies of the vertebrae. If the obstruction be the result of an exaggerated ligament of Treitz, the dilatation will terminate just to the left of the bodies of the vertebrae.

We have an additional lesion in the duodenum caused by extrinsic bands, the most common being Harris' membrane, which arises from the transverse colon near the hepatic flexure, runs across the caput of the duodenum, and is attached to the gastro-hepatic omentum. The obstruction here is caused by a drag from the colon, and in these patients there is almost invariably an associated obstinate constipation. Relief from the constipation, and recumbency, will often give relief from the upper abdominal distress. This again, by the irregularity of its occurrence, the absence of periods of wellbeing and the definite relationship to constipation, is differentiated from ulcer and from ileus.

There is a further lesion, namely pylorospasm. There appears to be an idiopathic pylorospasm which cannot be ascribed to any definite intra-peritoneal lesion. This gives symptoms very similar to duodenal ulcer, the essential difference being that, while it is also characterized by a definite periodicity, the occurrence of symptoms almost invariably coincides with over-work, worry, fatigue or excessive tobacco. The symptoms almost in-

variably disappear on a holiday, and often will stop suddenly around fifty years of age. It is characterized by burning, eructations of gas, and relief by soda.

It will be noted that nothing has been said regarding bleeding, in the diagnosis of lesions in the stomach or duodenum. Reference to this has been omitted designedly, because haemorrhage from the upper gastro-intestinal tract does not necessarily mean ulcer. Haemorrhage itself as an indication for operative interference is very rarely justifiable. We must remember oesophageal varices, and a general weeping from the stomach mucosa, as a possible source of the haemorrhage, rather than an ulcer. For every life that is saved by a precipitate laparotomy for haematemesis, many will be lost, because often nothing will be found which can be dealt with surgically during the course of a profuse gastric haemorrhage.

There remain only lesions associated with the biliary apparatus and pancreas as causes of upper abdominal symptoms. In probably no other condition is a carefully taken clinical history, with the proper interpretation of the symptoms elicited, of greater value than in diseases of the biliary tract. Disease of the gallbladder can be divided into three stages, the first in which all the symptoms are reflex and directly referable to the stomach; the second in which the symptoms are referable to the right upper quadrant intimately associated with the gallbladder area; the third, the stage of tragedies, characterized by common duct obstruction, with jaundice, acute haemorrhagic pancreatitis, and acute cholecystitis. If this conception of a three-stage development of disease in the gallbladder and biliary tract be correct, then one must admit that gallstones are merely an incident in cholecystitis, occurring in the second stage, but absent in the first. In the analysis of many hundreds of case histories of proven gallbladder disease, we find there have been minor gastro-intestinal upsets dating from childhood, such as diarrhoeas in infancy, bilious attacks and sick headaches. The outstanding factor in the history of a cholecystitis through the years is that, unlike ulcer, it is not characterized by any remission, but in taking the history, one must be careful to appreciate

what the patient understands by being well. The patient who at fifty years of age is suffering from a calculous cholecystitis, has suffered from gastro-intestinal disturbances for so long, that the minor upsets are accepted as inevitable, and unless severe distress intervenes, he will consider himself well. It is only by noting definitely whether he has or has not continuously normal symptomless gastro-intestinal metabolism, that minor upsets can be elicited. A continuous disability is to my mind of the greatest importance in the substantiation of a clinical diagnosis of cholecystitis. Again, in cholecystitis, unlike some of the lower gastro-intestinal lesions, the patient's feeling of well-being or of distress bears no relationship to the time of day, but is directly associated with the intake of food. In other words, they do not consistently feel better or worse in the morning or in the evening, and in very few instances is their distress of sufficient severity to confine them to bed, or even to keep them away from business. A very apt comment by Dr. McVicar of the Mayo Clinic is that if the patient goes to the kitchen and takes soda, he probably has an ulcer; if he wants to argue with you, he probably has a cholecystitis. Repeated x-ray studies of patients suffering from cholecystitis have shown that the altered motion in the stomach is the result of a spasm, which, when not relaxing in the course of normal peristalsis, produces increased intragastric tension, resulting in the symptoms of distress—belching, pyrosis, nausea or vomiting, depending upon the degree and duration of the obstruction produced by the spasm. We know that this occurs from one-half to two hours after the ingestion of food, when the gallbladder should have emptied its bile into the duodenum, but as a result of the inflammatory reaction in the wall of the gallbladder itself, the law of contrary innervation is upset, and the sphincter of Oddi at the opening of the common bile duct into the duodenum does not relax when the gallbladder contracts. This local abnormal physiological condition causes reflex spasm in the stomach, with resultant symptoms. This is the picture of the first stage of a cholecystitis, and explains why the symptoms are all referable to the stomach, rather than to the gallbladder area.

The second stage offers much less difficulty

in diagnosis. Calculi are present and moving, producing local obstruction and pain, with symptoms directly referable to the gallbladder, in addition to the reflex gastric symptoms. As the gallbladder was derived embryologically from the ninth somatic segment on the right side, there is present fairly constantly a tender point over the posterior division of the right ninth intercostal nerve at the border of the erector spinae. In a fair percentage of cases there is also a cutaneous hyperesthesia over the angle of the right scapula. When this latter sign is present it may be regarded as a real confirmation of a pathological gallbladder. The textbooks are very much in accord in the statement that pain from a diseased gallbladder is referred to the shoulder. Let it be emphasized that, while one may elicit pain referred to the shoulder, and at operation find a diseased gallbladder, the disease has extended farther afield and involved the diaphragm, because only through the phrenic nerve can pain be distributed to the shoulder. Pain in the region of the shoulder, which is the result of a diseased gallbladder solely, is situated over the angle of the right scapula.

Occasionally, gallstones are found in a gallbladder when no history of a non-calculous cholecystitis can be elicited. In most instances such gallstones have been found in women who have borne many children in rapid succession, and are merely the result of the precipitation of the excess cholesterol content of the blood which is present at this time, and are not primarily due to infection. Recently, x-ray after the patient has taken iodine has given further aid in the diagnosis of cholecystitis. The unfortunate factor in connection with this means of diagnosis is that positive findings are present only with a normal gallbladder mucous membrane. This leaves so many loopholes for failure, that it is not of as great value as would appear on the surface.

In the third stage, the diagnosis is still more obvious, because of the fever, jaundice, or palpable, tender mass in the region of the gallbladder. Our duty as clinicians, however, lies in diagnosing the diseased gallbladder in the first stage, where the mortality is one-half of one per cent, rather than waiting until it reaches the third stage, where the mortality varies all the way from ten to twenty-five per

cent. Jaundice as a symptom of upper abdominal disease must be mentioned, but to deal exhaustively with jaundice as a symptom is out of place in this discussion. It must be remembered, however, in the splenomegaly, usually known as Banti's disease, that as a result of the increased flow of blood from the splenic veins to the portal system, bile pigment is often precipitated in the gallbladder in the form of non-facetted mulberry stones, which may give typical biliary colic and jaundice, whereas the disease lies primarily in the spleen. This also reminds one of the possibility of familial jaundice, and the various other lesions responsible for extra-hepatic jaundice. The enlargement of the spleen fortunately is present in most cases of extra-hepatic jaundice, and will give a clue to the proper interpretation.

*To summarize.*—To arrive at a differential diagnosis of diseases involving the upper gastrointestinal tract, one must appreciate that all symptoms are the result of irregular normal gastro-intestinal motions; that altered secretion which may be present in disease is so inconstantly altered as to be of no value; that this alteration in secretion is just as likely to be the result, as the cause of the disease process. The interpretation of the various symptoms is based on a knowledge of normal physiological processes in health. The localization and the extent of the pathological condition present are determined by the character of the life history of the disease process. Where the lesion is the result of a mechanical interference with function, or the result of a reflex disturbance from an organ which does not spontaneously recover, such as the gallbladder, there is a continuous history of a disability which is not characterized by any remissions, but may be characterized by exacerbations of a more severe disability. On the other hand, if the disease process changes insofar as the gross pathological picture is concerned, then we can have a similar change in life history. For instance, in duodenal ulcer, because of the fact that the ulcer heals over and subsequently breaks down, we have that recurrent type of indigestion extending over even twenty or thirty years, characterized by periods of extreme wellbeing between the attacks of indigestion. Further, because inflammatory processes are superimposed upon a chronic lesion, there is again a continuity of symptoms, as well

as symptoms which may previously have been closely related to time of day, or to the ingestion of food. In gastric ulcers, particularly in the early stages of their development, there are periods of remission, but as the ulcerative process extends and involves surrounding structures in a peri-gastric inflammation, there is continuous disability. Therefore symptoms—

their relationship to the ingestion of food, and their relationship to the time of day, and their relationship to each other throughout the life history of the disease, must form a fundamental groundwork upon which to build up the clinical differential diagnosis of upper gastro-intestinal lesions.

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GOLDIE, *Jour. of Iowa State Med. Soc.*, July, 1925.

## THE MANAGEMENT OF GASTRIC AND DUODENAL ULCER

BY DONALD C. BALFOUR, M.D.

*Rochester, Minn.*

*An Address delivered before the Academy of Medicine, Toronto.*

*Abstract by R. V. B. Shier, M.B. (Tor.)*

ONLY a few years have elapsed since the subject of ulcer was in a state of confusion, due chiefly to the failure to recognize the various types, the differences between them, the difficulty of diagnosis, and the uncertainties of management. During recent years much of this confusion and uncertainty has been replaced by an accumulation of well established and well recognized facts.

A discussion of the management of gastric and duodenal ulcer should include: (1) a brief reference to certain aspects of peptic ulcer which have an important bearing on the results of management; (2) the diagnosis of gastric and duodenal ulcer; (3) the indications for the different methods of treatment; (4) a summary of the medical management; (5) a survey of the surgical management of the uncomplicated ulcer and of the complications; (6) the results of such management.

*Cause of ulcer.*—There are two aspects of ulcer which require investigation. The cause of the acute erosion and the reason why this acute erosion does not heal but becomes chronic, the latter being of most importance. Mann has shown that by the diversion of the contents of the duodenum into the terminal ileum and the attachment of the jejunum to the stomach, a chronic ulcer forms, which apparently has all the characteristics seen in man.

This experiment led the way to the study of the healing of ulcers. There is first a cleaning of the base of the lesion, the slough separates, and a coating of serum and coagulum forms over healthy granulations. This process takes four days, and is accompanied by epithelial growth at the edge of the ulcer. Once initiated the healing, if undisturbed, is rapid, and in thirty days the lesion is usually healed entirely, the resulting scar being scarcely noticeable.

Morton has recently carried out experiments based on the two facts that acute lesions in the normal stomach heal readily, and that the method of surgical duodenal drainage described by Mann and Williamson produced ulcers in the jejunum in almost 100 per cent of experiments.

Recent studies on the physiology of the gastro-intestinal tract have also a bearing on the pathogenesis of ulcer. Ryle of Guy's Hospital suggests the possibility that chronic disturbances of function are probably the predisposing causes of ulcer, and that disturbances in motility are of major importance. The emphasis which the late Sir James MacKenzie laid on the importance of the recognition of early symptoms and early variations from normal has stimulated more intensive study of such early symptoms. The rôle

of infection as shown by Rosenow should always be considered.

*Frequency of ulcer.*—Our general impression is that the incidence of ulcer of the stomach and duodenum is on the increase. Duodenal ulcer is met with about ten times as frequently as gastric ulcer, and gastric carcinoma about three and a half times as frequently as gastric ulcer. Gastric ulcers are very rarely within 4 or 5 c.m. of the pylorus, and pyloric obstructions, except when due to malignant disease, are almost always due to the involvement of the pyloric ring by the induration of a duodenal ulcer.

*Diagnosis.*—So far as the diagnosis of gastric and duodenal ulcer is concerned, the outstanding advance which has been made in the last decade has been their recognition by the Roentgen ray, and this method of depicting its presence is so precise that it is true that lesions which are difficult to demonstrate at operation can be definitely demonstrated by the Roentgen ray. The accuracy of the Roentgen ray in gastric ulcer is about 96 per cent. Duodenal ulcers examined by competent Roentgenologists can by indirect signs be diagnosed in 94 per cent of cases. The typical syndrome of both gastric and duodenal ulcers is too well known to require comment, but it should be emphasized that the uninterrupted course of gastric and duodenal ulcers is recognizable by the fact that the symptoms become progressively worse after the ulcer has become established. It should be remembered, however, that there is a margin of error in the Roentgenological diagnosis, and that the experienced clinician will not change his opinion if the clinical history is positive for ulcer. When, however, the Roentgen ray shows a lesion to be present in the stomach regardless of the severity and character of the symptoms and the degree of the patient's disability, the fact that three out of four chances are in favour of the lesion being malignant should be borne in mind, and the patient advised accordingly.

*Complications.*—The characteristic signs of acute perforation are now generally recognized. The fact that early operation gives the only prospect of saving the patient's life, and that in the first few hours operation is as safe as in any abdominal operation, has been proved

repeatedly. It is also realized that with the passage of hours, operation is less and less likely to save life. If ulcers are situated on the posterior wall, which is the most common site for it, and also for duodenal ulcer, subacute perforations with attachments to structures behind the stomach and duodenum are usually followed by a change of symptoms and usually by a lumbar pain. In gastric haemorrhage, it may be difficult to determine whether an ulcer is actively present or not, and to decide on the best form of treatment. It is well to emphasize the fact that there are many causes both extragastric and intragastric for the haemorrhage other than ulcer.

The diagnosis of obstruction may be made from the findings brought out in the clinical history of the patient; by a history of retention of food and by a gastric analysis. A most important phase of obstruction is concerned with the possible association of a varying degree of toxæmia. In 1921 Berkman directed attention to the excessive operative mortality rate in such cases, and was able to show that by sufficient preoperative gastric lavage, and by carrying out the operative procedure in two stages (the relief of the obstruction and the removal of the cause of the obstruction) the necessary surgical measures could be accomplished with much less risk. The results stimulated further studies, so that now one can determine the surgical risk in such cases, and by means of preoperative management can so reduce this risk that it has become possible to eliminate practically the necessity of the two-stage operation.

Many observers have described the toxæmia associated with high intestinal obstruction, but only recently have such observations been adequately applied to the control or elimination of such toxæmia as a preparation for surgical treatment. In 1923 Brown, Eusterman, Hartman, and Rowntree described the chemical changes in the blood in such cases, and McVicar recently reported thirty cases of this type showing how the chemical condition of the blood parallels the clinical condition of the patient, the degree of toxæmia being determined by the increase in the blood urea, the increase in the carbon-dioxide combining power (alkalosis), and the decrease of blood chlorides. He has shown that tetany may be anticipated when

the carbon-dioxide combining power exceeds 100 per cent by volume. The restoration of normal balance is accomplished by administering sodium chloride solution and 10 per cent glucose intravenously and by avoiding alkalies.

The two most important facts in connection with carcinomatous degeneration of gastric ulcer are first, that it does occur, and second that there is no known means of recognizing it early.

*Indications for treatment.*—The indications for medical treatment depend largely on the situation of the lesion and as to whether the lesion is gastric or duodenal. In cases of chronic ulcer *prolonged medical treatment is justified only* when operative treatment is absolutely contra-indicated because of the age or condition of the patient. As a temporary expedient medical treatment may not only be justifiable but of marked value in improving the condition of the patient, for whom surgical measures become unduly hazardous because of repeated haemorrhages, extensive local inflammatory changes, and toxæmia from gastric retention. The more familiar we become with the uninterrupted course of chronic gastric ulcer, the more certain we become that prolonged medical treatment is *never* justifiable in a patient that is fit for operation.

In cases of chronic duodenal ulcer, objections to medical treatment do not exist since the symptoms are not usually so severe, the disability not so great, and the danger of fatal complications not so marked. Medical treatment of chronic duodenal ulcer is therefore not uncommon, but the data concerning late results are not so satisfactory as might be wished. Undoubtedly certain patients are relieved by medical treatment, and most surgeons agree that one thorough course of medical treatment of uncomplicated chronic duodenal ulcer is justifiable before surgical interference is advised. The length of time the medical treatment of duodenal ulcer should be persisted in depends on the patient's symptomatic response, his economic status, general health, and his willingness to follow treatment. In most cases of chronic duodenal ulcer, however, surgical treatment is sooner or later indicated.

*Preoperative preparation.*—Nothing has been more gratifying in the management of peptic

ulcer and its complications than the work of McVicar and his colleagues in preparing patients for operation. This preoperative study and preparation enables the clinician to develop familiarity with the surgical problems involved, and to be of the greatest service in determining when the operation should be performed, and to suggest before the operation what would be the best procedure to employ in that particular case. Patients with marked anaemia secondary to single or repeated haemorrhages from peptic ulcer should be under competent medical supervision until the maximal improvement has been reached.

*Operative procedure.*—A most essential procedure is a careful abdominal exploration: first because it is becoming increasingly apparent that lesions are often multiple in the stomach and duodenum; secondly because of the possibility that other unrecognized diseases in the abdomen may be responsible for an unsatisfactory result, which would be unfairly attributed to failure of the operation. It is usually easy to recognize an ulcer at the operating-table, but an embarrassing situation may arise when the clinician and roentgenologist concur in the diagnosis of ulcer and the surgeon is not able to find one. This occasionally does occur even after the stomach and duodenum have been opened to explore the mucosa. It is rarely that gastric ulcer is overlooked although small ulcers on the posterior wall are sometimes difficult to find. If the surgeon cannot find an ulcer, no operation should be performed on the stomach regardless of the positiveness of the clinical and roentgenological examination.

When duodenal ulcer has been found it is important to remember that no one operation will always give perfect results. There are at present four surgical procedures for duodenal ulcer: (1) gastro-enterostomy with or without excision of the ulcer; (2) pyloroplasty or partial duodenectomy, with or without excision of the ulcer; (3) excision alone; (4) partial gastrectomy.

Gastroenterostomy still continues to be the basic method of treatment; its evolution has been most interesting. The earliest method was the anti-peristaltic, the next the posterior anti-peristaltic with a long loop, and the next, the posterior iso-peristaltic. At the present

time the operation commonly performed is the posterior no-loop anti-peristaltic. It was on the results of this operation that surgical treatment of peptic ulcer became firmly established. The operation is safe, the mortality (being only between one and two per cent); it is also usually simple and can often be performed when any other procedure is definitely contra-indicated.

The first and most important rule for avoiding failure is to be certain that proper indications for the operation exist. The ulcer must be demonstrable either by inspection, or, if on the posterior wall by opening the anterior wall of the duodenum or stomach and using direct inspection, or by both inspection and palpation. Posterior ulcers are much more common than we have believed and they are usually associated with a scar on the anterior wall, which is the only lesion recognized. The more extensive the lesion, the wider the extra-duodenal inflammatory changes; the more marked the obstruction, the higher the gastric acidity; the longer the duration of symptoms, and the greater the disability of the patient, the more definite are the indications for gastroenterostomy and the more certain its results. Accordingly the results are not so certain in the presence of mild symptoms, short duration, low acidity, a small uncomplicated lesion and a small stomach. Such cases are satisfactory for local excision with or without pyloroplasty, but the end-results are not definitely better than with gastroenterostomy. Of the many important details of gastroenterostomy the following may be emphasized:

1. A large opening at the most dependent part of the stomach. The importance of a large stoma cannot be overestimated. As the ulcer heals under the effect of gastroenterostomy the pyloric spasm is relieved, the pylorus functions more readily and there is a tendency for the new stoma to contract. This contraction may reach such a point that the stoma does not function, thereby creating a reversion to the same condition that was present before operation with possible reactivation of the ulcer. Anterior gastroenterostomy is a more useful substitute for posterior gastroenterostomy than is generally believed.

2. The proximal loop of jejunum should not be too short.

3. The segment of stomach surrounding the anastomosis should funnel on all sides to a distance of at least 2.5 cm. below the opening in the meso-colon, and the edges of the latter should be sutured snugly to the stomach, particularly in those cases in which there is an excess of fat in the meso-colon. In the Mayo Clinic during the last nineteen years gastroenterostomy has been performed 5755 times, local excision with or without pyloroplasty 296 times, and resection forty-three times. None of these operations will give absolute assurance against recurrence of ulcer or haemorrhage or persistence of symptoms due to the original causes underlying the complaint.

*Partial gastric exclusion.*—In those cases in which the lesion is so extensive that there is no reasonable possibility of excising it and no obstruction exists, partial gastric exclusion as described by Devine of Australia is an operation to be kept in mind. In this operation the end of the pyloric segment is closed and the end of the upper segment of stomach anastomosed to the jejunum as a posterior Polya operation. The operation is no more difficult than gastroenterostomy and I have performed it in a number of cases with excellent results.

*Treatment of complications.*—*Haemorrhage* is a complication in about 25 per cent of gastric ulcers, and in 20 per cent of duodenal ulcers, and in about 16 per cent of gastric carcinoma. The cause of the haemorrhage should be definitely established before operative procedure is carried out. If there is a history of ulcer and the ulcer is shown by the Roentgen ray, operation is clearly indicated. In a case of acute gastric haemorrhage emergency surgical measures are usually contra-indicated because recovery almost invariably follows a primary gross haemorrhage from peptic ulcer, and because in those cases in which a single haemorrhage is sufficient to cause death, an emergency operation would not save a patient's life. If, however, a second haemorrhage occurs operation is indicated. If the haemoglobin is below 40 per cent transfusion before operation adds safety. The surgical treatment of bleeding gastric and duodenal ulcer is removal of the ulcer either by cautery or knife combined with gastroenterostomy, partial duodenectomy, or in some cases partial gastric exclusion. In 8 per cent of cases after any type of operation,

haemorrhage has been reported, which may be due to first, an overlooked ulcer, second a recurring ulcer, third, disease of the other abdominal organs, or fourth, foci of infection elsewhere in the body.

The management of acute and unprotected *perforation* depends on the lesion, the patient's condition and the surgeon's experience. These determine the question of whether or not gastroenterostomy should be added to the closure of the perforation. It has been shown that in many cases in which the perforation was closed only, symptoms developed necessitating the second operation of gastroenterostomy. In protected perforations there are difficulties encountered from a surgical standpoint, particularly in cases of gastric ulcer. In duodenal ulcer the problem is simplified, for the more extensive the infection, and the more recent the infection, the more certainly should the area of ulceration and infection be left undisturbed and the indirect operation of gastroenterostomy performed. The results of such treatment are excellent.

*Considerations especially applicable to gastric ulcer.*—The selection of the proper operative procedure in gastric ulcer depends on the site of the lesion, its size and activity, and the extent of perigastric attachments. The value of any operation for gastric ulcer should be judged on four main considerations, simplicity, applicability, immediate results, and ultimate results. For simplicity, gastroenterostomy stands first, but gastroenterostomy alone will not ensure as good permanent results as when combined with excision of the ulcer. The simplest method by which the ulcer can be removed is by local excision and for this the advantages of the cautery have been repeatedly demonstrated because of its ease of performance and its sound basis, namely the effect of heat on infected and malignant tissues. It is fortunate that we have such a safe, simple, and effective measure as excision by cautery and gastroenterostomy, the combination of which has been attended by such satisfactory results. Compared with these procedures partial gastrectomy is primarily at a serious disadvantage, for the chances of mishap are too many to warrant its adoption except by surgeons of considerable experience.

The situation of the lesion to a large extent

dictates the operative procedure. Ulcers of the lesser curvature comprise 90 per cent of cases. Ulcers with crater less than 1 c.m. in diameter have been best managed in my experience by knife excision or cautery excision combined with gastroenterostomy. For small ulcers on the lesser curvature in positions less easily accessible, excision preferably by cautery followed by gastroenterostomy is very satisfactory and as a matter of fact is the only radical treatment that can be carried out with reasonable safety. Gastric resection is certainly not warranted in these cases of small high lying ulcers, because of its technical difficulties and because the amount of healthy stomach removed is out of all proportion to the size of the ulcer.

Ulcers of the lesser curvature with a crater larger than 2 c.m. in diameter with extensive induration, adhesions to neighbouring structures and organs, and indications of possible malignancy, must be dealt with quite differently from the small uncomplicated ulcers. If a large ulcer is near the pyloric end of the stomach, pyloric resection is the operation of choice unless the lesion is so fixed to surrounding tissues and is in such an acute inflammatory state that its mobilization is unwise. The indications for subtotal gastrectomy become less clear the farther an ulcer of this type is from the pylorus although so far as such an ulcer is reasonably accessible and can be mobilized safely, gastric resection is the best procedure.

The selection of the best operation for the small uncomplicated ulcers and the large complicated ones of the lesser curvature is therefore not difficult. When an ulcer between these two types is met with on the lesser curvature, however, the best operation is not easily chosen. The difficulty of deciding is further increased by the difficulties of differential diagnosis between simplex ulcer and carcinomatous change. However, the danger of a primary gastric carcinoma or a carcinomatous ulcer being wrongly diagnosed or unrecognized by the combined findings of a well qualified internist, a roentgenologist, and a surgeon, I believe to be almost negligible. The operation of choice in these cases of gastric ulcer 2 c.m. or more in diameter is gastric resection; in all other cases cautery excision and gastroenterostomy, except in cases of

ulcer so near the cardia that access is too difficult, when gastroenterostomy alone will give good results.

Ulcers on the posterior curvature usually have extensive craters and are attached to the pancreas. It is a requisite of any operative procedure undertaken for such ulcers, that the stomach and pancreas shall be separated. This is accomplished through the stomach, through the gastro-hepatic omentum, or through the transverse meso-colon. The edges of the opening into the stomach should be fairly cauterized, the surface of the pancreas seared, the opening into the stomach closed, and gastroenterostomy performed. If the lesion is large, separation should be followed by partial gastrectomy.

*Partial gastrectomy.*—There are various types of partial gastrectomy. Continental surgeons favour the Billroth I method, while British and American favour the Billroth II method, or modifications of it. The operation, in which the end of the duodenum is excluded and gastro-intestinal continuity restored by uniting the end of the stomach to the jejunum through the transverse meso-colon, commonly known as the Polya operation, has become very well established and is very satisfactory. Occasionally in cases of gastric ulcer and more commonly in cases of gastric carcinoma, it is found that the resection of the stomach is so extensive that trans-meso-colic anastomosis is difficult and cannot be safely made. Under such circumstances anastomosis made on a long loop in front of the colon is the best method to employ.

*Results of operation.*—The safety of surgical treatment of lesions of the stomach and duodenum is illustrated by a recent report which I was able to make of 400 consecutive operations, on the stomach and duodenum, with but four deaths. One hundred and thirteen of the operations were for gastric carcinoma. The operation was partial gastrectomy in forty-six cases with one death; in fifty-eight the operation was for gastric ulcer with one death following jejunostomy for an irremovable subacute lesion; in 161 it was for chronic duodenal ulcer (in 143 of these, gastroenterostomy was performed with no deaths and in

eighteen, other types of other operations) with one death following excision and gastroenterostomy, and in twenty-two it was for gastroduodenal ulcer with one death following partial gastrectomy. Partial gastrectomy was performed in 114 cases with two deaths; in forty-six cases for carcinoma, in thirty-four for gastric ulcer, in six for recurring duodenal ulcer, in nine for combined gastric and duodenal ulcers, in sixteen for gastroduodenal ulcer, and in one each for sarcoma of the stomach, hypertrophy of the pylorus and malfunctioning gastroenteric stroma.

Pain is the predominating symptom of ulcer and is usually the symptom from which relief is sought. In 1000 patients 986 had complained of pain before operation, and after a lapse of ten years only ninety reported the return of pain in any degree of severity and only twenty-two of these considered is sufficient to bring them back for re-examination. Vomiting was a symptom in 611 cases before operation, and reports show recurrence in only twenty-five. Haematemesis, or melena, or both occurred in 286 cases before operation, and the recurrence of these symptoms has been reported in fifty-seven cases. These cases were all treated for a duodenal ulcer by gastroenterostomy. The effectiveness of the operation in preventing further ulceration is shown by the fact that in only thirty-five instances has recurring ulcer been known to appear. Protection against subsequent ulceration is apparently absolute, not a single case being reported. A compilation of the end results in this series of cases shows that in 88 per cent, relief from the symptoms for which the operation was performed, has been satisfactory. Failures in those cases in which there were real indications for gastroenterostomy, but in which the results from the operation were unsatisfactory occurred in a series of 343 cases, reviewed at the Mayo Clinic, in which disconnection of the anastomosis was at least part of the secondary operation. The unfortunate result was shown to be chiefly due to (1) imperfect functioning due to a defect in the anastomosis itself, or the location of it; (2) to overlooked intra-abdominal disease; and (3) to a recurring ulcer.

## THE ETIOLOGY OF MALIGNANT NEOPLASMS\*

BY JULIAN LOUDON, B.A., M.B., M.R.C.S., F.A.C.P.

*Chief Physician, St. Michael's Hospital, Toronto**Associate in Medicine, University of Toronto*

JAMES M. McCORMACK, M.D., C.M.

*Physician, St. Michael's Hospital, Toronto*

AND NORMAN J. HOWARD, M. SOC. AM. BACT., M. AM. C. SOC.

*Bacteriologist in Charge of Water Purification, City of Toronto*

IN the whole field of medical research, there cannot be found a more fascinating or important study than that of malignant growths. Nor is there any subject that affords more possibilities for fruitful results because of the channels opened by such workers as Rous,<sup>1</sup> Young,<sup>2</sup> Nuzum,<sup>3</sup> Gye<sup>4</sup> and Barnard.<sup>5</sup>

*The Parasitic Doctrine.*—The idea that cancerous growths are contagious, and, therefore, due to some sort of infection is one of the oldest hypotheses; but it was not until the seventies or eighties of the last century, when Pasteur, Lister and others were making such vast strides in the elucidation of microbial diseases, that we began to hear of microorganisms in connection with the etiology of malignant neoplasms. Some of the outstanding advocates of the doctrine of the microbial origin at the end of the last and the beginning of the present century are Scheuerlen, Soudakewitch, Ruffer, Korotneff, Plimmer, Jackson-Clarke, San Felice, Russell, Ochsner, Emery, Montsarrat, Ford Robertson, Doyen, Brand and Coley.

The vast majority of the members of the medical profession were at that time, however, so taken up by the fanciful theories of Ribbert as to have practically abandoned the parasitic theory as impossible. Not until Rous demonstrated the etiologic factor in chicken sarcoma to be a something, the life of which is independent of the life of the sarcoma cell was any new evidence brought forth in favour of the

parasitic theory. The final proof of the microbial nature of the Rous tumour came later when it was shown to be possible to cultivate the organism outside the body.<sup>4, 6 & 7</sup>

For us, the evidence, both clinical and experimental, has always lent credence to the parasitic doctrine. This belief became firmly established in the summer of 1920 when we witnessed a demonstration by Dr. Glover of malignant growths produced in animals by inoculations of cultures of a microorganism isolated from human cancerous growths. We afterwards repeated these experiments in our own research laboratory in 1924. Since that time we have published several papers describing our observations and experiences<sup>6</sup>; and in this article shall attempt to present a brief summary of our work up to the present time. For the benefit of those engaged in research along this line, the work of Scott<sup>7</sup> should also be mentioned.

All the work here reported has been performed under *rigid aseptic conditions* with scrupulous care and accompanied by proper controls; equipment and materials used have been thoroughly sterilized, and in order to test sterility all media employed have been incubated before using. Following the method of Glover, strictly avoiding the employment of any malignant tissue showing evidence of necrosis or ulceration, we have been able to isolate a morphologically-similar Gram-positive pleomorphic microorganism from every type of malignant growth with which we worked. These growths included human carcinoma, mouse carcinoma 63, rat carcinoma, human sarcoma, rat sarcoma (Jensen), and Rous chicken sarcoma No. 1. This microorganism not only

\* Read before the Clinical Society of St. Joseph's Hospital, Toronto, accompanied by a demonstration of pathological specimens, bacteriological cultures, microscopic slides, and lantern illustrations, March 3, 1926.

exists within the tumour cells, but is present as a bacteræmia in the blood of the hosts. Its life history is decidedly peculiar and consists of three separate and distinct stages, viz: (1) bacillus, (2) coccus, and (3) spore-sac. Each of these individual stages can be grown in pure culture, but an alteration in the composition or the reaction of the culture medium or its environment may cause one stage to pass into another in the above order or the reverse. An intermediate phase between the bacillus and coccus stages is the so-called spore phase in which the microorganism assumes an ovoid form. As far as we have been able to observe, the complete life history of this pleomorphic microorganism is represented by bacillus, spore, coccus, spore-sac, and a filtrable phase which will be discussed later.

In addition to the metamorphosis from stage to stage, variations of a lesser degree occur in each individual stage. For example, spore-sacs exhibit variations in size and shape, and may or may not be associated with hyphæ. Coccii are spherical and comparatively small when passing to and from the spore-sacs, but are ovoid and larger (the so-called spores) when giving rise to bacilli. Bacilli are small and thin when young, but become longer and thicker when older and containing spores. It may be mentioned, in addition, that Young has deduced an amorphous phase which he considers to be an essential link in the life history of this organism. A striking feature of its life cycle is that it is filtrable in at least one of its phases. This test is demonstrated in two ways, as follows:

1. A fluid culture of actively growing microorganisms in either the bacillus or the coccus stage is first passed through a sterile Buchner filter, in which pressed sterile pulp one-half inch in thickness has been placed, to rid it of all the larger solid particles. The filtrate is then passed under pressure through a Berkefeld filter which has been previously tested against unfilterable organisms. A portion of the second filtrate is placed in tubes of the medium and incubated, some aerobically and some anaerobically, at 37° C. Within forty-eight hours pure cultures of bacilli or cocci which show all the characteristics of the Glover microorganism are found to be present. Controls are invariably negative.

2. A piece of fresh carcinomatous tissue is divided into two parts. Portions of one part are placed in tubes of the media and incubated, some aerobically and some anaerobically, at 37° C. The other part is minced with sharp scissors and thoroughly ground with sand in a porcelain mortar in order to break up the cells; Ringer's solution is then added until the mass is well diluted and all is then thoroughly mixed. The suspension is next filtered and allowed to gravitate through a Buchner filter in which layers of pressed pulp and sand have been placed in order to remove the sand and crushed tumour cells. This clear filtrate is then passed under pressure through a Berkefeld filter which has previously been tested against unfilterable organisms. The second filtrate is placed in tubes of the media and incubated, some aerobically and some anaerobically, at 37° C. After one to three days, pure cultures which are identical with those cultivated from the corresponding part of the same tissue are obtained.

*Bio-Chemical Reactions.*—Extensive work has been carried out in studying the bio-chemical reactions of the various cultures. As might be expected, certain uniform variations occur in the reactions, and as these are being made the subject of further investigations it is not proposed to elaborate on them at this time. We have found that the amount of gaseous fermentation and the increase of acidity in the carbohydrate media, and the peptonisation of nutritive gelatin, depend upon the virulence of the cultures. Under conditions existing at the time of isolation from fresh tissue, it is not unusual to find the organism in an attenuated form. The frequent passing of the attenuated culture in fluid medium greatly increases its virulence. Attenuation of the organism is also brought about by keeping the culture under conditions unfavourable to its growth, or by subculturing on other than the Glover media. This may cause the organism to lose its specific properties, in greater or lesser degree, varying with the degree of attenuation. In its attenuated state the organism will usually ferment only maltose, dextrose and levulose, but practically always increases the pH. of the other sugar media if the degree of attenuation has not gone too far.

For the fermentation tests carbohydrates are

added to the media to give 1 per cent solutions and the reactions fixed at pH. 7.2 to pH. 7.6. These are then sterilized in an Arnold sterilizer for twenty minutes on three consecutive days. The media are then inoculated with loops of the pellicle which had been repeatedly passed in the fluid media and incubated along with controls at 37° C. They are examined after twenty-four and forty-eight hour intervals and it is found that maltose, dextrose, levulose, nutrose, salicin, saccharose, xylose, dextrin, galactose, inulin, lactose and mannose are fermented. Controls are invariably negative.

*Production of New Growths in Experimental Animals.*—Our work in producing new growths by means of inoculation of pure cultures of various strains of the Glover microorganism consists chiefly in the production of carcinoma in mice and sarcoma in fowl. As our work with chicken sarcoma has already been described rather minutely in a paper published in the *Canada Lancet and Practitioner* we shall here only refer the reader to that journal.<sup>6</sup>

In mice we have been able to produce carcinomatous growths in a fair proportion of cases surviving the toxic effects of the inoculations. The strains of organisms used in the mice inoculations were human carcinoma and mouse carcinoma 63. The inoculations were made into the breasts.

#### Conclusions

1. We have cultured and described a morphologically-similar, Gram-positive pleomorphic organism isolated from the fresh tissue of human carcinoma, mouse carcinoma 63, rat carcinoma, human sarcoma, rat sarcoma (Jensen), and Rous chicken sarcoma No. 1; also from the blood of the hosts of these malignant growths.

2. The organism in one of its phases is filtrable, and in this filtrable phase it is invisible

under the highest power of the ordinary microscope.

3. The etiologic factor in all malignant growths is the pleomorphic organism herein described. It is admitted, however, that infection does not usually take place clinically unless the defences of the cell have been broken by some preceding condition which lowers the resistance to infection.

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#### IRREGULAR PRACTICE

In our issue of last month we presented our readers with an epitome by our London correspondent of the discussion which took place in the House of Commons over the case of Dr.

Axham, whose name was removed from the Medical Register for irregular practice.

In the miscellaneous columns of this issue we publish the Editorial remarks of *The Times* on Lord Dawson's address in Parliament on the same subject. Both, we believe, will be read with interest by the profession in Canada.

## BLOOD CHANGES IN RABBITS RESEMBLING THOSE IN PERNICIOUS ANÆMIA ACCOMPANYING *B. WELCHII* INFECTIONS

BY GUILFORD B. REED, PH.D., J. H. ORR, M.S., AND C. H. BURLEIGH

*Department of Bacteriology, Queen's University, Kingston*

HERTER'S familiar theory of the relation of *B. Welchii* to pernicious anæmia has been conspicuously revived by Cornell<sup>1</sup> who recently demonstrated the possibility of producing long standing *B. Welchii* infections in rabbits and that the resulting blood changes resemble those which characterize pernicious anæmia in man. Since the observations on which this paper is based were completed, Moench, Kahn and Torry<sup>3</sup> have reported the extension of Herter's particular observations by showing that both *B. coli* and *B. Welchii* are present in the large intestine of pernicious anæmia patients in larger numbers than in the intestine of normal persons or those suffering from other pathological conditions. More recently Kahn and Torry<sup>3</sup> have shown that repeated small injections of *B. Welchii* toxin results in a pernicious anæmia-like blood picture in monkeys.

The present paper constitutes a report on the first of a series of rabbits inoculated with *B. Welchii*.

*B. Welchii culture used.*—In the series of experiments reported in this paper a highly virulent strain of *B. Welchii* has been used, probably a transplant from Bull's<sup>4</sup> strain 911. The culture, however, was not obtained directly from Dr. Bull and has been in this laboratory for some time. Before use in these experiments it was subjected to several pigeon passages until its maximum toxicity was reached. The purity of the culture, moreover, was insured by frequent plating in an anaerobic jar.

*Procedure: inoculation and observation.*—Most of the animals have been inoculated with the fluid portion of cultures grown in a chopped meat medium, while in a few cases a suspension of washed organisms in saline have been used. The majority of the animals have been inoculated subcutaneously; where this route was followed a point on the left side over the short ribs was selected. In a few cases the organisms have been injected into the muscle at the base

of the tongue, and a few others were given intravenous inoculations.

The rabbits were kept under observation for some time previous to inoculation, while particular attention was paid to blood counts and to the structure of the blood cells. Following the inoculations red and white cell counts, blood cell structure, haemoglobin and gross weight determinations were made at intervals depending upon the general condition of the animals and the rate of observed blood change. In addition to the qualitative comparison of the blood films from all the animals studied, in a representative number a quantitative determination of the degree of anisocytosis has also been made following the procedure introduced by Price-Jones<sup>5</sup>. For this purpose a sufficient number of microscopical fields, the field being the area of a circle about half the diameter of the total field, were selected at random to include 1,000 or in some cases 500 red cells and the diameter of all those cells measured.

All animals which died or were killed were subjected to a careful post mortem examination and the visceral organs, skeletal muscle and bone marrow were cultured anaerobically.

*Protocols of four typical cases.*—*Rabbit F*, Mature male in good health. Red cells 6,500,000. Haemoglobin 90%, weight 2160 gms. Red cells uniform and normal in structure (Chart I curve A).

Inoculated subcutaneously in the side over the short ribs with 1 c.c. of a two day old culture.

*1 day after inoculation.*—Slight oedema at the site of inoculation. Red cells 6,550,000. Haemoglobin 90%. Red cells normal in structure.

*4 days.*—Local reaction rather less marked than on the first day. Animal inactive and weak. Red cells 3,700,000. Haemoglobin 85%. Weight 1620 gms. Approximately half the red cells consist of spherical microcytes and macrocytes many of which are polychromatophilic. (Chart I, curve B).

**9 days.**—Local reaction less conspicuous than on the first and fourth days. The animal is extremely weak, unable to stand and refuses food. Red cells 1,700,000. Haemoglobin 25%. Weight 1530 gms.

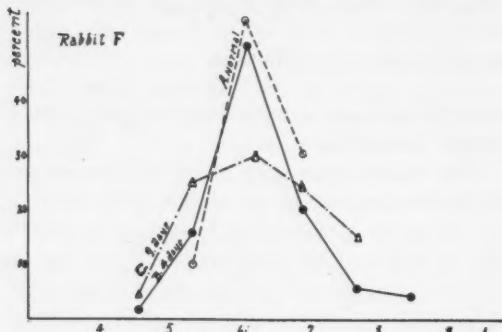


CHART I.—Rabbit F. Curves showing the variation in diameter of red cells, curve A, in the normal untreated animal and at four and nine days after inoculation with *B. Welchii*. The abscissa represent cell diameter in  $\mu$  and the ordinates the percentage occurrence of each size group.

Red cells consist almost entirely of spherical deep eosin staining microcytes and various sizes of macrocytes many of which take the basic stain. Poikilocytosis is conspicuous. (Chart I, curve C).

The animal died toward the end of the ninth day after inoculation. All the tissues appear normal except the bone marrow which was deep red in colour. Cultures from the blood, spleen, liver and marrow taken thirty minutes after death were negative. The subcutaneous fluid from the region of the inoculation and thigh muscle both yielded pure cultures of *B. Welchii*.

**Rabbit H.**—Mature, healthy, male. Red cells 6,800,000. Haemoglobin 90%. Weight 1860 gms. Red cells uniform and normal in structure Chart II, curve A. Inoculated subcutaneously in the side over the short ribs with 1 c.c. of 2 day old culture.

**1 day after inoculation.**—Slight swelling over the site of inoculation. Animal active and apparently quite normal. Red cells 6,400,000. Haemoglobin 85%. Weight 1590 gms. Red cells are mostly normal in structure but there are a few microcytes and some polychromatophilia among normal sized cells. (Chart II, curve B).

**5 days.**—Several subcutaneous nodules have appeared over the abdomen. The animal is very weak and taking almost no food. Red cells 1,400,000. Haemoglobin 30%. Weight 1,590 gms.

Red cells consist mostly of very large macrocytes, many of which show polychromatophilic staining; others are very pale and especially thin in the centre. The majority of these large cells are circular in outline, but many are oval or irregular and a small number show the formation of buds and an oozing out of the stroma. There are also a few microcytes most of which are spherical, and deep eosin staining; others are characteristic poikilocytes. A considerable number of nucleated red cells are also present, both normoblasts and megaloblasts (Chart II, curve C).

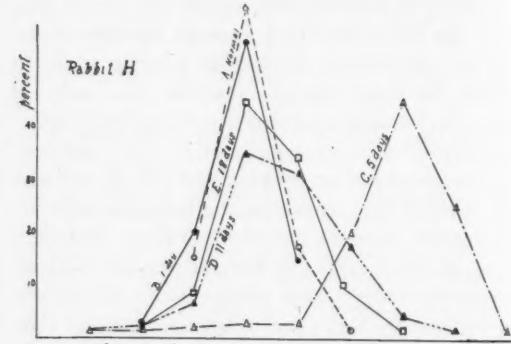


CHART II.—Rabbit H. Curves showing the variation in diameter of red cells, curve A, in the normal untreated animal and at 1, 5, 11 and 18 days after inoculation with *B. Welchii*. The abscissa represent cell diameter in  $\mu$  and the ordinates the percentage occurrence of each size group.

**11 days.**—The animal appears slightly more active than on the fifth day. Many of the subcutaneous nodules over the abdomen have coalesced to form a large semi-solid mass over which the skin has ruptured, to form an opening about 5 cm. long. There is no drainage but smears show the semi-solid subcutaneous mass to consist of coagulum, necrotic cells and a small proportion of polynuclear leucocytes along with viable *B. Welchii* and *B. coli*.

Red cells 4,100,000. Haemoglobin 85%. Weight 1650 gms. Red cells appear similar to those of the fifth day but the proportion of large macrocytes is not so high and there are very few nucleated red cells. (Chart II, curve D).

**18 days.**—Animal weak and inactive, no change in the abdominal lesion from the 11th day. Red cells 5,700,000. Haemoglobin 85%. Weight 1680 gms. Red cells very similar to those of the 11th day but a slightly larger proportion of normal cells and fewer macrocytes. (Chart II, curve E).

**21 days.**—Animal very weak, unable to stand. Red cells count 6,100,000. Haemoglobin 85%. Red cells similar to those of the 11th and 18th days, but with a conspicuous increase in the number of moderate sized macrocytes.

The animal was killed as it seemed likely to die during the night. The subcutaneous abscess contained 40 to 50 c.c. semi-solid material as noted above along with viable *B. Welchii* and *B. coli*. Other body tissues appeared normal and cultures from the blood, spleen, liver and marrow proved negative.

**Rabbit J. 1.**—Young mature doe. Red cell count 5,610,000, three successive daily examinations of the blood showed normal uniform cells (Fig. 1 to 7). Inoculated subcutaneously in the side over the short ribs with 0.25 c.c. of a six day old culture.

**1st day after inoculation.**—Slight hyperemia and oedema at the point of inoculation. A subcutaneous area of oedema 4–5 cm. in diameter in the middle of the abdomen. Blood count unchanged but the red cells show a very slight anisocytosis.

**7th day.**.. Reaction at the site of inoculation has disappeared. Abdominal edematous area persists unchanged in size, but it is becoming indurated and shows red-brown skin staining. Red cells 2,000,000. Haemoglobin 35%. Red cells are to a large extent macrocytes, many polychromatophilic. The few microcytes are mostly spherical, deep eosin staining cells. A considerable proportion of the cells show various irregular outlines to extreme poikilocytosis. (Chart III, curve C, and Fig. 3 and 4).

**8th day.**—Animal appears very weak but shows some appetite. Skin over abdominal swelling has ruptured exposing a semi-solid mass of necrotic tissue, leucocytes, viable *B. Welchii* and *B. coli*. Red cell 2,760,000. Haemoglobin 55%. Red cells appear similar to those on the 7th day but quantitative measure shows the macrocytes to be slightly smaller.

**11th day.**—Animal still weak, but appetite evidently improving. No change to be seen in the skin lesion. Red cells similar to those of the 7th day but a larger proportion of normal cells and the macrocytes are no too large. (Fig. 5).

**22nd day.**—Animal perfectly active. Skin lesion still open but much reduced in size. Very few organisms seen in films of exudate but de-

monstrated in culture. Red cell count, 5,480,000. Haemoglobin 80%. Red cells more nearly normal but still show many macrocytes, polychromatophilia, and some poikilocytosis.

**42nd day.**—Skin lesion is still present but very small and almost closed. Red cell count 7,000,000. Haemoglobin 85%. Red cells are mostly normal in structure, but a small proportion of macrocytes persist. (Chart III, curve E and Fig. 7).

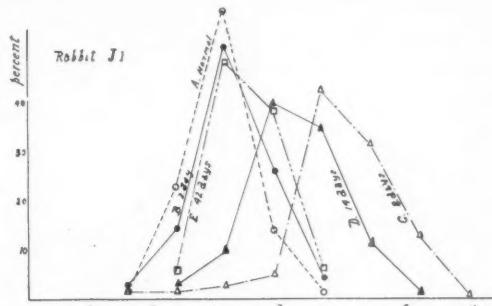


CHART III.—Rabbit J.1. Curves showing the variation in diameter of red cells, curve A, in the normal untreated animal and at 1, 8, 14 and 42 days after inoculation with *B. Welchii*. The abscissa represent cell diameter in  $\mu$  and the ordinates the percentage occurrence of each size group.

**53rd day.**—The skin lesion has completely closed and all swelling has subsided leaving the area evidently normal. Red cells 6,800,000. Haemoglobin 90%. Red cells appear in every way normal.

**89th day.**—Red cells normal in number and in structure.

**Rabbit No. 33.**—A young healthy animal not quite fully grown. Red cells 6,240,000. Haemoglobin 95%. White cells 4,200. Weight 1400 gms. Red cells uniform and normal in structure. (Chart IV, curve A).

Inoculated intravenously with 3 c.c. of a twenty-four hour culture *B. Welchii* 911 to which formalin to 0.5 per cent had been added forty-eight hours previous to infection. The culture contained an abundance of viable organisms at the time of inoculation.

**4 days after infection.**—The animal is very weak, shows little activity and almost no appetite.

Red cells 2,400,000. Haemoglobin 55%. White cells 6,000. Weight 1,357 gms. The red cells show extreme size variation from small microcytes most of which are spherical, to very large

macrocytes. There is much polychromatophilia especially among the large cells, some stippled cells, and a very few nucleated red cells mostly megaloblasts. Many cells show conspicuous irregularity in outline from oval and triangular forms to the more extreme poikilocytes.

**5 days.**—No change in the animal's general condition. Red cells 2,720,000. Haemoglobin 60%. White cells 12,200. Red cells consist mostly of very large macrocytes, many of which are polychromatophilic and many very irregular in form. There are very few microcytes or normal cells. (Chart IV, curve C).

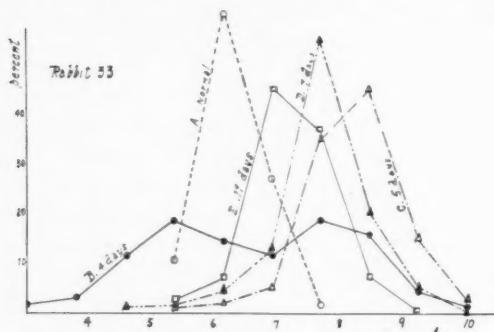


CHART IV.—Rabbit 33. Curves showing the variation in diameter of red cells, curve A, in the normal untreated animal and at 4, 5, 7 and 11 days after inoculation with *B. Welchii*. The abscissa represent cell diameter in  $\mu$  and the ordinates the percentage occurrence of each size group.

**7 days.**—The animal appears slightly more active and is taking more food. Red cells 2,900,000. Haemoglobin 75%. White cells 6,600. Weight 1,380 gms. Red cells are similar to those of the fifth day but slightly smaller in size. (Chart IV, curve D).

**9 days.**—The animal is active and much stronger. Red cells 4,050,000. Haemoglobin 80%. White cells 5,800. Weight 1410 gms. The red cells are still mostly macrocytes similar to those of the fifth and seventh day but slightly smaller.

**11 days.**—The animal is perfectly active and appears quite normal. Red cells 5,240,000. Haemoglobin 80%. White cells 6,400. Weight 1530 gms. Red cells similar to those of the 9th day. (Chart IV, curve E).

**18 days.**—The animal appears quite normal. Red cells 5,680,000. Haemoglobin 90%. White cells 4,800. Weight 1,560 gms. The red cells are mostly normal in structure but appreciable numbers of macrocytes, many of them polychromatophilic, persist.

**36 days.**—The animal appears quite normal.

Red cells 6,020,000. Haemoglobin 90%. White cells 7,400. Weight 1680 gms. The red cells are similar to those of the 18th day though macrocytes are less numerous.

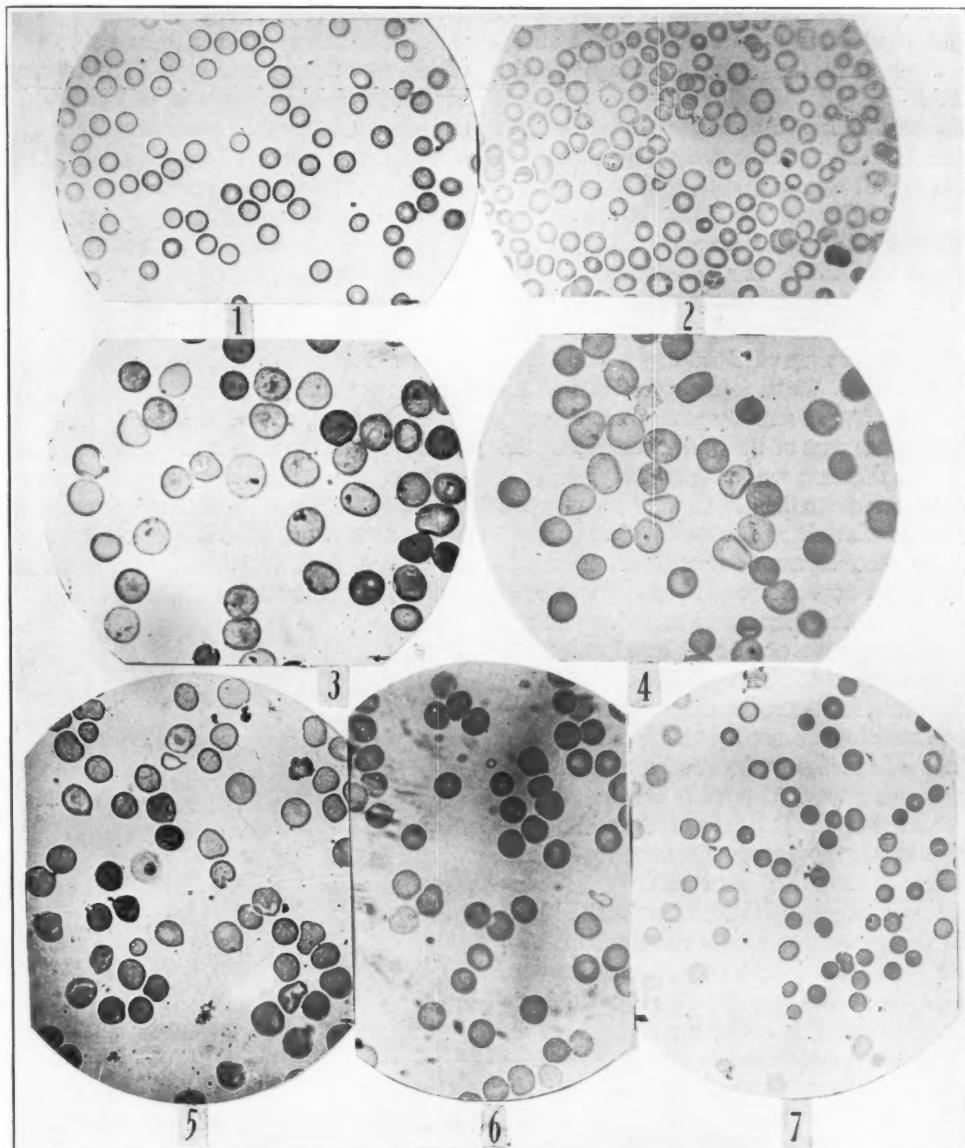
**54 days.**—Animal normal.

**General nature of the infections.**—These four brief histories are characteristic of the reactions of forty-four rabbits inoculated with this strain of *B. Welchii*. The course of the infection and the accompanying blood pictures depend to a large degree upon the number of organisms introduced, and more especially upon the age of the culture. If the culture was grown on chopped meat medium for about twenty-four hours at 37°, and 1/4 to 1 e.c. of the fluid portion injected subcutaneously, or intramuscularly the rabbit in every case developed a bacteræmia and died in fifteen to thirty six hours. The intramuscular route usually produced a considerably more rapid reaction than a subcutaneous inoculation. Similar cultures, however, kept in the ice box for five to ten days following a twenty-four hour incubation period, exhibited much less aggressive action, and though rabbits given 1/4 to 1 e.c. of the fluid developed a conspicuous local or spreading infection they usually survived for at least five to ten days, and in the majority of cases for a much longer period. Similar results were obtained with organisms from young cultures washed by centrifuging and resuspending in saline. The animals which withstood the infection for three to four weeks, have after three to four months apparently completely recovered.

All the animals which died in one to two days after the inoculation developed a bacteræmia; in those which died two to three weeks after the inoculation only localized or spreading *B. Welchii* infection was found. In those which suffered from an infection for days or weeks and eventually recovered, when killed, no viable *B. Welchii* were found in the tissues. The spreading infection in both the animals which succumbed to it, and in those which survived followed a characteristic course. The subcutaneous inoculation in the side over the short ribs was followed in twelve to twenty-four hours by a very small area of hyperæmia and edema, which extended in three to four days to the median ventral line from the region of the diaphragm to near the groin, in a band three to five centi-

meters wide. The inflammation at the site of the inoculation, and the band across the chest wall cleared rapidly, while that along the ventral line of the abdomen persisted. In a number of animals the œdematosus area became indur-

ated in five to ten days and the cutaneous tissue red-brown in colour, which condition was followed in a smaller proportion of cases by rupture of the skin in one or several places along the line of the infection. The less severe lesions



Photomicrographs of blood films from Rabbit J. 1 taken just before and at various intervals after inoculation with *B. Welchii*. The films were all stained with Wright's stain and all photographed with the same setting of the camera so that the magnification is the same in each case. Fig. 1. The normal blood. Fig. 2. Two days after inoculation, showing a small proportion of both microcytes, macrocytes and poikilocytes. Fig. 3. and Fig. 4. Seven days, showing only large macrocytes, the darkly staining cells are polychromatophilic cells. Fig. 5. Eleven days, showing somewhat smaller macrocytes, a megaloblast (near the centre of the field) a few poikilocytes and several polychromatophilic cells. Fig. 6. Fourteen days showing slightly smaller macrocytes and a few poikilocytes. Fig. 7. Forty-second day showing an almost normal film of cells.

healed in three to five weeks and the animals have apparently completely recovered.

The animals which died in two to three weeks after infection lost from twenty to thirty per cent of their body weight; those which suffered from a chronic infection and later recovered, lost from ten to twenty per cent of their original weight. The lowest weight occurred as a rule a few days after the maximum stage of the anaemia.

*Characteristics of the anaemia produced.*—The anaemias produced in the forty four animals in this series all closely resemble that in the four cases quoted above. The extent of the anaemia appeared to be roughly proportional to the extent and duration of the infection.

In the most characteristic cases, where the animals survived for several weeks, the minimum red cell counts were obtained one to two weeks after infection. These counts ranged in different animals from a scarcely perceptible decrease to twenty per cent of the normal number. The maximum decrease was usually followed by a gradual increase to the normal number, and even in animals which died two to three weeks after infection the maximum decrease was often followed by an appreciable increase. In animals which died a few days after infection the fall in red cell count was much more rapid, and death usually occurred at the time of lowest count.

The white cell counts usually showed an increase frequently amounting to two to four times the normal number. The maximum white cell count usually coincided with the lowest red cell count, but the decrease in the white cells number to normal was usually more rapid than the recovery of the red cell count.

The percentage of haemoglobin in the blood of all these anaemic animals remained slightly higher than the percentage of erythrocytes. Though the colour index was seldom high, it never dropped below one and was usually found to be appreciably above the normal. The percentage of haemoglobin in the surviving cells therefore remained high.

At all stages of the anaemia, a certain amount of poikilocytosis was apparent, though seldom pronounced. During the stage of recovery from the most severe decrease in red cell numbers, a few nucleated red cells could usually be found while polychromatophilic cells were abundant, but the distinctive and most significant

feature of this anaemia was the anisocytosis. This is made most evident in the Price-Jones curves of variation in erythrocyte diameter accompanying the four case histories quoted above. These included (Figs. 1, 2, 3 and 4) are characteristic of several which have been determined and plotted from our series of animals. Cornell<sup>1</sup> shows a similar curve from a rabbit after intrasplenic *B. Welchii* inoculation, but although the change in cell size was not as great as in most of our cases, the condition persisted for a much longer period. It may be observed from these curves that in the normal animals the red cells are comparatively uniform, whereas after infection with *B. Welchii* the cells show a marked departure from the normal size. The first change is an increase in microcytes followed by a much more conspicuous increase in macrocytes, though a few small cells usually persist, the result being the development of a variation curve much more spread out at the base than the normal, and a mean cell size considerably above normal. The mean size of the cells of the four animals before treatment was 6.2 mikrons, and 7.8 mibrons at the period of greatest size variation noted or an average increase of 1.26 times.

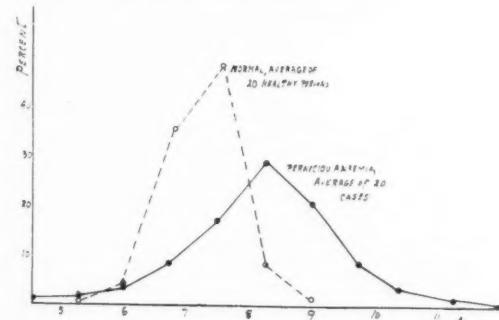


CHART V.—Curves showing the variation in diameter, A in normal human red cells, 500 cells from each of 20 healthy persons measured; B in pernicious anaemia cases, 500 cells from each of 20 persons measured (data from Price-Jones, 1922).

Comparison of these curves with those prepared by Price-Jones<sup>5</sup> and Hurst<sup>6</sup> from the blood of pernicious anaemia cases is very suggestive. To facilitate the comparison an average of the former author's data has been plotted on the same scale as used with the rabbit blood results. (Chart V). The same comparatively slight variation of the normal human red cells are shown

by this curve while the cells of the pernicious anaemia cases show a very great variation indicated by the broad spreading variation curve and a mean cell size 1.14 times larger than the normal. Hurst<sup>6</sup> shows similar curves of normal and pernicious anaemia blood cells. These two authors moreover conclude that curves of this type characterize pernicious anaemia in sharp contrast to secondary anaemias.

At the present time, however, we only indicate the similarity of our experimental results to pernicious anaemia.

#### Summary

1. It has been shown that a highly virulent strain of *B. Welchii* may produce chronic or acute infection in rabbits depending upon the age of the culture used.

2. Rabbits suffering from acute or chronic infection with *B. Welchii* develop a profound anaemia characterized by a decrease in red cell

numbers without a corresponding decrease in haemoglobin and by conspicuous anisocytosis.

3. Quantitative examination of the degree of anisocytosis shows that it resembles that of pernicious anaemia in man.

These results are presented in the form of a progress report, other data are in process of publication elsewhere concerning the action of *B. Welchii* toxin on red blood cells both in vivo and in vitro and on other tissues. We wish to acknowledge our indebtedness to Dr. Beaumont S. Cornell of Brockville, Ont. with whom we have frequently discussed these problems.

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## TUBERCULOSIS OF THE TONGUE\*

BY CHARLES K. P. HENRY, M.D.

*Surgeon to Montreal General Hospital,*

TUBERCULOSIS of the tongue as a primary lesion is so rare that but few cases are recorded. As a secondary lesion due to pulmonary and laryngeal tuberculosis it is still uncommon enough to warrant reporting four cases that have been observed recently. The diagnosis of the lesion is easy when the associated conditions are recognized, though in one of my cases the patient had been given anti-syphilitic treatment, and when the therapeutic test failed he was referred to me, as a possible case of cancer of the tongue.

The condition appears almost exclusively in males of any age, irrespective of the use of tobacco, but often associated with the presence of carious and jagged teeth, as in cancer of the tongue. Traumatism may be, and likely is, a factor in the production of the ulcer, which usually occurs at the tip or forward side of

the tongue. The ulcer is usually single, but may be multiple and in all cases seen by me has been preceded by the existence of a nodule for several months. The nodule is soft, not tender nor painful. It finally breaks down in the centre and is often surrounded by a small ring of smaller nodules, tubercles of pinhead size. The resulting ulcer is always painful, often extremely so, resulting in inability to eat, loss of sleep, and in salivation.

The ulceration is always superficial, tends to have a thin undereut edge and does not show much marginal induration nor bleed readily. The base is reddish and shows small yellow-white areas of caseation. Contrary to reports I have seen, there was no enlargement of the lymph nodes, even when ulceration was extensive and of long standing. (Case 2).

The diagnosis from cancer is usually easily made by the history, the size of the lesion which is much larger than is usual for a malignant

\* Presented at the Montreal Medico-Chirurgical Society March 5, 1926.

ulcer of the same duration, the absence of induration, and the association of advanced tuberculosis in larynx and lungs. In all cases reported the immense number of tubercle bacilli in the sputum was noteworthy.

The treatment of the tongue lesion depends largely on the condition of the patient. Surgical excision, with immediate suture of the edges, resulting in primary healing is most desirable. A general anaesthetic cannot be given, but local anaesthesia is quite satisfactory. In two of four cases the disease was so far advanced that excision was unwise. Locally, solutions of cocaine, to be used prior to eating, orthoform dusting powder, or silver nitrate in strength of 10 to 20 per cent can be applied daily. In some cases the division of the lingual nerve under local anaesthesia, or the alcohol injection of the inferior maxillary division of the fifth nerve will result in marked relief of pain, and allow the patient to eat and gain in strength and weight. All the usual means of treating the tuberculous patient need no mention. Cases often undergo healing, even with considerable ulceration of the tongue, but as a rule the occurrence of such ulceration is a grave prognostic omen.

*Case 1.*—J.S., male, aged fifty-four years. Admitted to Montreal General Hospital April 27, 1925. Discharged May 1, 1925.

*Complaints.*—Sore on tongue; chronic cough and expectoration.

*Personal History.*—Enlisted in army when twenty-one; served in India and Africa. Had several attacks of malaria. Came to Canada fifteen years ago. Enlisted again in 1915, but was returned to Canada because of chronic cough in 1916. In October, 1924, had several attacks of pulmonary haemorrhage.

*Family History.*—Negative for tuberculosis.

*History Present Illness.*—In August, 1924, noticed a small, painless swelling on the left and under side of his tongue. It gradually increased in size, and in six months caused mouth irritation and induced him to cease smoking. It was treated at a dispensary by cauterization.

*Local Condition.*—The left side of the tongue is deformed with three superficial ulcers and some scarring. Edge is indurated and slightly painful to the touch. The adjacent floor of the mouth is swollen, but not indurated. There are no palpable lymph glands in the neck.

*The general condition* is that of emaciation and anaemia associated with pulmonary tuberculosis. There is cavity formation in upper lobes of both lungs, recognized clinically and by x-ray on April 28, 1925. He had also pyuria of undetermined origin. He had considerable sputum containing bacilli in large numbers.

*Treatment.*—Discharged as condition was not operable and referred to the Royal Edward Institute. He died at the Home for Incurables in November 1925.

*Case 2.*—L.R., male, aged twenty-nine years. Admitted May 15, 1925, to the Surgical Service of the Montreal General Hospital. Discharged June 11, 1925.

*Complaints.*—Sore left side of tongue; cough; weakness; loss of weight.

*Personal History.*—Had influenza with pneumonia in 1918; otherwise negative.

*History Present Illness.*—About four months ago he noticed a small lump on the left side of tongue. Later several others appeared and gradually the whole left side of his tongue became sore and eroded. There were no carious teeth locally to cause irritation. Six months ago he began to have malaise, pain in back and became easily tired. Has lost thirty-five pounds. About six weeks ago began to cough and sputum became blood tinged.

*Local Condition.*—Left side of tongue has a ragged appearance, somewhat indurated, but not deeply ulcerated. There are no palpable glands in the neck.

*General Condition.*—Poorly nourished, weak, marked difficulty in speaking and eating. Expectoration is considerable; minute caseous nodules present. Tubercle bacilli found in large numbers. Bilateral pulmonary tuberculosis recognized clinically and by x-ray May 16, 1925.

*Treatment.*—Quartz lamp therapy, etc. Condition not operable. Returned home July 7, 1925. No after history obtained.

*Case 3.*—G.R., private patient, male, aged twenty-four years. Under treatment May 15, 1925 to March 5, 1926.

*Complaints.*—Cough; cold; expectoration; and no-due on tongue.

*Personal History.*—Frequent colds and coughs. Four searches for *spirochaeta pallida* which were negative. Wassermann was twice negative, even following injection of neo-salvarsan.

*Present Condition.*—Voice husky, though he states this is normal for him. Has a slight, frequent cough. Colour is good, and temperature normal. Recently had a tooth extracted and dentist made no comment on his mouth condition. Tongue shows a heaped up, raised, firm, central nodule posteriorly, and opposite to it a circular red area on palate, not ulcerated. There are pale areas on the buccal surfaces of both cheeks like mucous patches. He has a pharyngitis and a patch on his tonsils. Has marked laryngitis with heaped-up interarytenoid spaces. Cervical glands are enlarged and tender. Epitrochlear, inguinal and posterior cervical glands are enlarged. Tongue coated. Chest examination

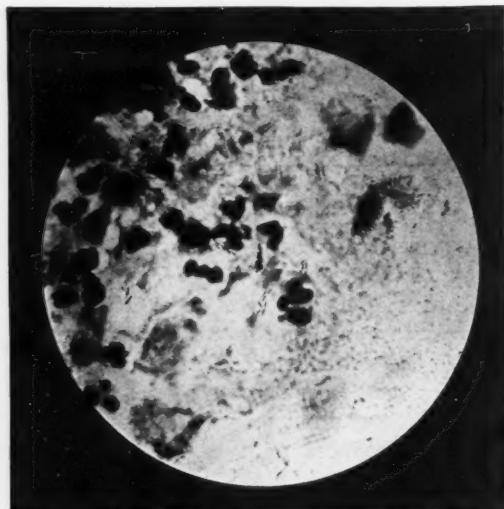


FIG. 1.—*Case No. 4.*—Sputum with large numbers of tubercle bacilli.

tion shows dulness on right side in upper third and right base. Multiple râles over both lungs, especially the right; earlier signs in the left lung. Bilateral pulmonary tuberculosis shown clinically and by x-ray, with presence of fluid at right base. Bacilli present in sputum in large numbers.

*Treatment.*—Admitted to sanitarium at Ste. Agathe on September 3, 1925.

*After History.*—March 5, 1926. General condition much improved; very good colour. Is more erect and energetic. Slight increase (five pounds) in weight. Less

cough and expectoration. Tongue shows nodule, possibly slightly larger; no ulceration; the palate now shows no redness opposite nodule and mucous membrane of mouth and pharynx is normal. Voice is clearer. There is only one gland palpable in the right side of the neck, the so-called tonsillar gland which is the size of a large lima bean. The position of the growth is well back and its excision from the centre of the tongue under local anaesthesia would be difficult. In the absence of ulceration and with the patient's general improvement its removal was postponed for the present.

*Case 4.*—F.C., male, aged forty years.

*Complaints.*—Cough and expectoration.

*Personal History.*—Born in England; in Canada twenty-one years. Had several attacks of pneumonia about the age of sixteen and later; dry pleurisy, no

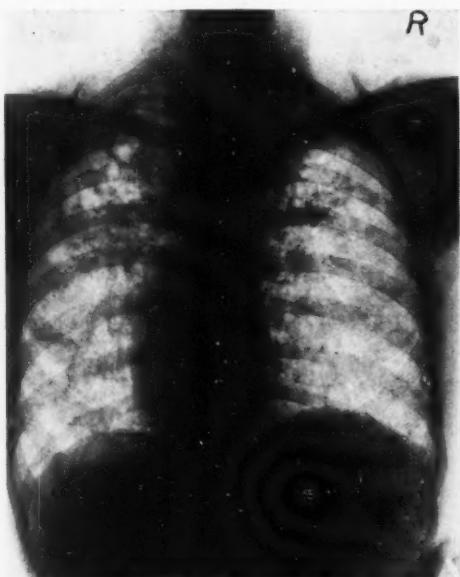


FIG. 2.—*Case No. 4.*—Bilateral extensive pulmonary infiltration with cavity formation in upper lobes.

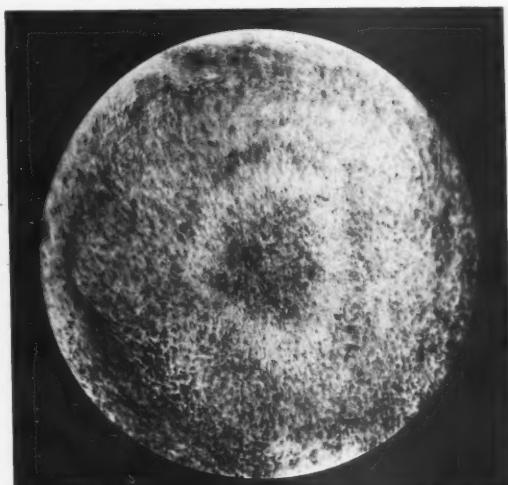


FIG. 4.—*Case No. 4.*—Tubercle from tongue showing central softening surrounded by cellular infiltration.

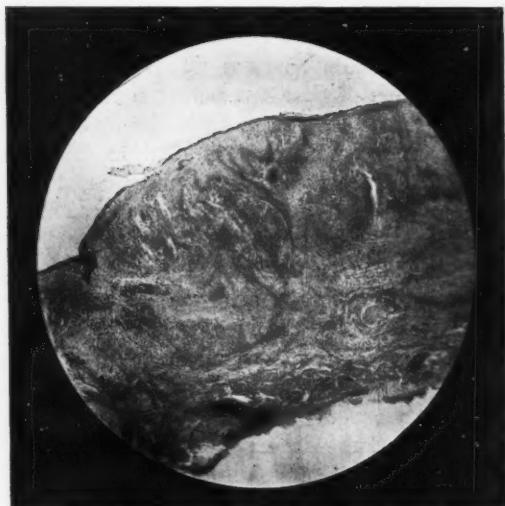


FIG. 3.—*Case No. 4.*—Section removed from tongue showing line of epithelium broken at ulcer and caseous tubercles.

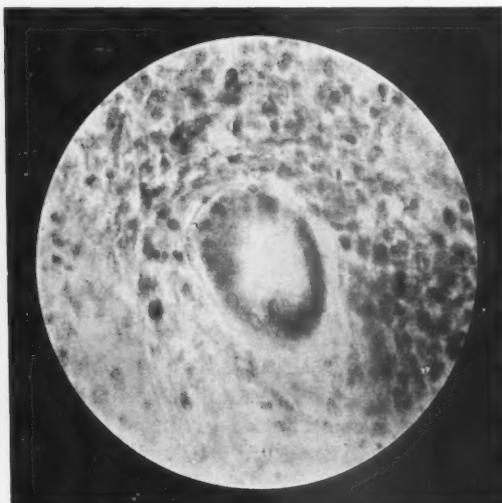


FIG. 5.—*Case No. 4.*—High power field showing typical giant cell.

effusion. Illness began about January, 1924, with loss of strength and loss of weight, twenty-five pounds; he suffered from night sweats and expectoration. He was sent to the sanitarium in July, 1925. Had secondary anaemia. Was admitted to surgical service, Montreal General Hospital in January, 1926, two years after onset of illness.

*Family History.*—Negative.

*History Present Illness.*—He noticed a pimple on tip of tongue about four to six weeks before leaving the hospital; it was not painful and he did not mention it. Two weeks after admission to sanitarium it became larger, painful to touch and ulcerated. It was daily painted with silver nitrate for one month. About December 25, 1925, it ceased growing and became less tender.

*Present Condition.*—Ulcer on end of tongue from midline to left, 1 by  $\frac{1}{2}$  cm, red and granular base and

with a whitish exudate on part of it. Not now tender. There are no enlarged submental, submaxillary or cervical glands. He shows clinical and x-ray evidence of extensive bilateral pulmonary tuberculosis with cavitation; his sputum is swarming with tubercle bacilli.

*Treatment.*—Under local anaesthesia the ulcer was excised on January 29, 1926, and the edges closed by catgut sutures. It readily healed with some slight deformity of the left side and tip of the tongue, but with no inconvenience to the patient therefrom. He is to enter the Laurentian sanitarium early in March, 1926.

The microphotographs were made in the Pathological Department of the Montreal General Hospital, under the supervision of the Director, Dr. Lawrence J. Rhea.

## LUNG EXPANSION AFTER ACUTE EMPYEMA

BY K. D. PANTON, M.B. (TOR.), F.R.C.S. (ED.)

Vancouver, B.C.

IT is an axiom of surgery that a collection of pus must be opened and the cavity drained. Such treatment allows the pus to escape, the walls of the cavity to collapse and adhere and as a rule is sufficient to effect a cure. In the case of empyema of the pleural cavity special factors are present in the rigid chest wall and the collapsed lung, creating a cavity the walls of which will not collapse, and when these factors are not considered it may happen that drainage will not result in cure. After rib resection the affected lung is adherent to the parietal pleura around the circumference of the empyema cavity, and the portion of lung which forms the inner wall of the cavity is flattened and collapsed. It is reasonable to believe that in addition to making provision for free drainage, measures should be taken to promote early re-expansion of the lung. Should it fail to expand, it becomes anchored in the collapsed state by organized lymph and adhesions with serious consequences for the patient.

Re-expansion of the collapsed lung is effected through respiration. As a rule only a portion of the lung is collapsed, but to simplify description, it will be spoken of as a collapsed lung. On inspiration the thoracic cavity is increased in size, a partial vacuum is produced in affected side and air rushes through the bronchi into

the sound lung to equalize the pressure. The lung increases in volume. The partial vacuum formed on the affected side is mainly equalized by the inrush of air through the opening in the chest wall into the empyema cavity. Consequently only a small quantity of air enters the collapsed lung to expand it. The air pressure then in the diseased side is equalized by the empyema cavity increasing in size and to some extent by expansion of the lung. Bartlett in his work on "After treatment of Surgical Patients", states; "It is a too little known axiom of chest surgery that an opening in the chest wall smaller than the interior of the larynx is a *sine qua non*, as every inspiratory effort causes the lung to expand rather than to deflate." We can therefore conclude that inspiration promotes re-expansion provided that the thoracotomy opening is small. During expiration the thoracic cavity decreases in size, air is forced from the lungs and out through the thoracotomy opening, and the affected lung decreases in size. In a week or so after rib resection when the discharge has lessened in amount, the large drainage tube is replaced by a small one and granulations form around it until only a small opening is left. Each inspiration then tends to expand the lung. As the infection clears up, adhesions form at the

periphery of the cavity and as the lung expands a little with each inspiration, these adhesions gradually anchor an increasing area of lung to the chest wall. It is a slow process and it is customary to attempt to hasten it by having the patient make forced expirations, blowing into bottles, air cushions, etc., and so balloon out the collapsed lung. During forced expiration the intra-thoracic pressure is much increased, and as the mediastinum is anchored air must be forced from the sound into the collapsed lung. The air in the empyema cavity escapes through the thoracotomy opening and the collapsed lung must be ballooned out. When the forced expiration ceases, the elastic tissue of the lung forces out the surplus air and the lung remains collapsed as before. It has probably less effect on re-expansion than has inspiration. Much more important is the general resisting power of the patient and his ability, aided by free drainage, to overcome the infection when, as before stated, adhesions form at the periphery of the cavity which anchor lung to chest wall. Dakin's solution, much used to irrigate empyema cavities, helps to clear up the infection present, and also softens and loosens masses of coagulated lymph when present. Persistence of the infection will prevent the formation of adhesions with the result that the cavity will remain.

Many devices have been invented to hasten lung expansion by creating a partial vacuum in the empyema cavity, whereby the lung is ballooned out to fill the vacuum and air is drawn into the lung through the bronchi. Not only will an effective device aid lung expansion but it will also clear up the infection present by increasing the blood supply of the whole area, and determining a flow of lymph into the empyema cavity, i.e., a Bier's hyperæmia will be produced. This flow of lymph decreases the absorption of toxins, and inhibits the multiplication of bacteria. Toxæmia is diminished, fever is reduced, pain is relieved and the absorption of inflammatory products is promoted. Such a process is a very real aid to the patient, and the favourable results are very evident when this treatment is used. The apparatus must also provide for adequate drainage. Should air leak into such an apparatus, as it usually does, and the vacuum be destroyed, the opening in the chest wall is still closed, therefore no air

enters the empyema cavity, and the vacuum produced in the affected side during inspiration must be equalized by expansion of the lung. This is an essential point in treatment, for practically, it is very difficult to apply an apparatus which is absolutely air tight. Air will leak in. We know that to get the best results when using Bier's hyperæmia an intermittent suction is best and we may also conclude that to hasten lung expansion, an intermittent suction is quite efficient.

Büla<sup>1</sup> of Vienna produced the first suction drainage apparatus for use in empyema. He introduced a tube through an intercostal space into the empyema cavity, the lower end of the tube being immersed in a bowl of solution. Syphon drainage was carried on until the tube became loosened through pressure necrosis. Perthes<sup>2</sup> performed rib resection and used a drainage tube fitted with a collar which was glued to the chest with collodion. Suction was obtained from a water faucet exhaust. Robinson<sup>3</sup> trephined a rib and screwed into the hole a threaded metal tube to which a long tube was attached. Many other devices have been used but suction drainage has never come into general use on account of the complicated nature of the apparatus and the constant care required to keep it working. Usually also the patient has been forced to remain stationary,

An apparatus has been used by the author for several years which is very satisfactory. It is not perfectly airtight, but it is easily and quickly made, is easily applied and gives less trouble than the usual dressings. Through its use the period of morbidity is much shortened and in one instance it certainly helped to save life by clearing up an overwhelming infection. The empyema cavity has been abolished in a minimum of eleven days and a maximum of twenty-one days. There have been no failures. The apparatus is applied after rib resection which should always be done to explore the whole cavity and also to evacuate any masses of coagulated lymph which if left, would block the drainage tube later. Rib resection is not done until the acute process has subsided and the lung has become adherent to the chest wall around the collection of pus. A description of the apparatus was published in this *Journal* in February, 1924. It is made as follows: A one-

quarter inch drainage tube about fifteen inches in length, extends from the empyema cavity to a wash bottle of about one litre capacity, which is to collect the discharge (Fig. 1). This tube

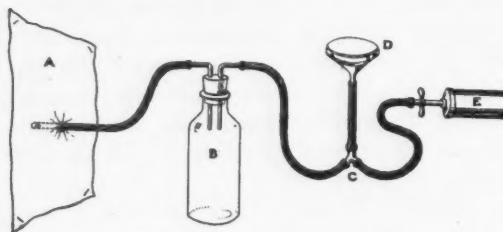


FIG. 1.—Suction Apparatus

- A.—Rubber sheeting, with corners perforated for tapes. Drainage tube perforating its centre.
- B.—Wash bottle, 1 litre size, which collects discharge and in which a partial vacuum is produced.
- C.—Y piece to unite manometer.
- D.—Manometer.
- E.—Vacuum Pump.

is threaded through a tiny hole in a piece of pure rubber sheeting at least nine by twelve inches, which is to lie over the opening in the chest wall. A piece of "inner tube" is satisfactory. To prevent the rubber sheeting from pinching the drainage tube and also to make an airtight union, a one inch section of glass tube is introduced into the drainage tube at the point where it penetrates the rubber sheet and the whole is bound together with linen thread, (Fig. 2). A vulcanized union is much neater. Tapes are attached to the corners of the rubber sheet to be fastened around the patient's chest.

The wash bottle is fitted with a rubber cork having two perforations with short glass tubes inserted. The drainage tube is fitted over one glass tube and a second rubber tube extends from the other glass tube to a small vacuum pump such as is used with Bier's cups. To prevent leakage through the pump, a three-way stop-cock is inserted into the tube in front of it, or the tube may be clamped with an artery forceps. A manometer is attached to indicate the amount of suction present. One may be made by lightly stretching a piece of rubber dental dam over the end of a small glass funnel. Strips of adhesive plaster wound around the funnel cement it in place. A short rubber tube joins the manometer to the tubing in front of the vacuum pump. A "Y" shaped glass or metal tube is used to unite the rubber tubes, (Fig. 1). All joints must be airtight.

The apparatus is applied as follows: A thick

coating of heavy sterile zinc oxide ointment is applied to the skin around the incision serving the double purpose of making an airtight union between skin and rubber sheeting and also protecting the skin. The drainage tube is inserted into the cavity after being sterilized, and the rubber sheet is fastened snugly to the skin by tying the tapes around the chest. A large pad of lambswool or non-absorbent cotton is placed over the rubber sheeting, the drainage tube being brought through its centre. Absorbent cotton is less elastic and is not so good as a pad. The pad is held in place by several pairs of adhesive strips and tapes such as are used for abdominal dressings. A binder is then applied around the chest over all. The drainage tube may be brought through a hole in the binder or the pins may bring the ends together in line with the tube. When applied snugly, no air can leak into the empyema cavity and also, the patient is comfortable.

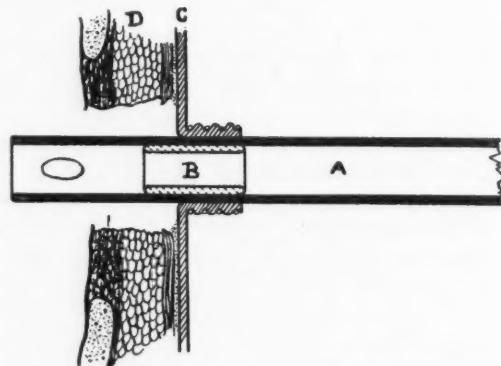


FIG. 2.—Detail of Closure of Chest Opening

- A.—Drainage tube, showing fenestrum at inner end.
- B.—Section of glass tubing, inserted in drainage tube and over which the rubber sheeting is tied with linen thread.
- C.—Section of rubber sheeting showing drainage tube perforating it.

D.—Chest wall, with thick layer of zinc oxide ointment between it and rubber sheeting.

The rest of the apparatus is now attached by connecting the drainage tube to the wash bottle and suction is applied by pumping out a little air. When the patient is to get out of bed a tape slings the wash bottle around the neck and he carries the apparatus around with him.

The amount of suction made is regulated by the sensations of the patient. Too great a vacuum causes him pain and is unnecessary. Sufficient vacuum to depress the rubber dam of the manometer one-third or one-half inch is

enough. The rubber dam rises and falls with respiration and in left sided cases it pulsates with the heart beat. Should the drainage tube become plugged it remains stationary and the tube should be removed and cleaned. When air leaks into the apparatus and destroys the vacuum the rubber dam becomes flat again. I have found that both nurses and patients take a great interest in the manometer and pump out air whenever necessary. The apparatus is removed daily for cleaning and if advisable for irrigating the cavity. No ill effects follow its removal. Later, it may be left in place for several days. The apparatus is continued in use until the cavity has disappeared and only a sinus remains, when the lung has become adherent to the chest wall. This has occurred when no air is expelled from the sinus on coughing and forced expiration. The sinus is then filled with 10 per cent bismuth paste and gives no further trouble.

Close attention to detail is essential to successfully use this apparatus, otherwise serious air leaks will occur which destroy its usefulness. The rubber cork must fit tight in the bottle and the glass tubes tight in the cork. It is best to tie linen thread around the rubber tubing at each joint to prevent leaks. Some specimens of rubber dental dam are porous and cause trouble. It is important to have the rubber sheet applied snugly and evenly to the skin and the binder applied snugly over the pad. A little experience will determine what the patient will stand comfortably. It is most provoking to find leaks in the apparatus after attaching it to the patient and it has been learned by experience that the apparatus should always be tested first. The test is made after connecting together all parts of the apparatus by clamping the drainage tube near the rubber sheeting with an artery forceps and then pumping out air until the dental dam on the indicator is well drawn in. It should remain drawn in. Leaks will cause it to flatten out in from ten to thirty minutes. A leak is readily found by immersing the whole apparatus in water and blowing steadily into the end of the drainage tube. Air bubbles will rise through the water from the leak indicating its position and the repair is made. When the thoracotomy opening is near the angle of the scapula, movements of the scapula are apt to

cause air leaks between skin and rubber sheet. Children are too restless to make satisfactory patients. Even if the vacuum disappears in twenty or thirty minutes and frequent repumping is required, the results are satisfactory, while with careful attention to detail it will last much longer. A surprising amount of discharge collects in the wash bottle. There may be from four to eight ounces daily at first and the suction soon changes it to a thin sero-pus which may be tinged with blood. This thin discharge is proof that the suction is sufficient and is causing an outflow of lymph. Fever will disappear and toxic symptoms vanish, and so far all patients have rapidly improved.

*Case 1.*—Male, aged thirty-two; labourer. Left sided empyema following lobar pneumonia. Rib resection of eighth rib in posterior axillary line. After three weeks of open drainage the cavity still held 1500 c.c. After one week more of suction drainage the cavity held 120 c.c. In this first case suction was kept up too long and a free watery discharge persisted. Suction was finally stopped and closure of the sinus followed the use of bismuth paste.

*Case 2.*—Female, aged fifty-five. Excision of rib performed for osteomyelitis following typhoid fever. Empyema followed rib resection and the patient became very toxic with high temperature and delirium. There were no limiting adhesions to the fluid. Suction drainage was introduced through the incision used for rib excision in anterior axillary line. The patient immediately improved and made a good recovery. In this case the drainage opening was not well placed and her condition was such that open drainage would not have saved her life.

*Case 3.*—Male, aged thirty; a drug addict. Developed empyema after pneumonia of right lower lobe. Aspiration produced 450 c.c. and the following day 900 c.c. were removed. Culture showed pneumococci and streptococci. The following day rib resection of the eighth rib was done in the posterior axillary line. Open drainage was carried on for six days with irrigations of Dakin's solution but progress was not satisfactory. The temperature rose daily to 101° and there was considerable cough and pain. On commencing suction drainage there was immediate improvement with fall of temperature and disappearance of other symptoms. The discharge had contained large masses of coagulated lymph. It soon changed to a thin sero-pus. In two weeks the cavity had diminished to a sinus with free discharge. It closed when injected with 10 per cent bismuth paste.

*Case 4.*—Male, aged thirty-eight, developed empyema following left sided pneumonia. X-ray examination reported fluid extending from the diaphragm to above the level of the clavicle on the lateral chest wall and as high as the upper part of hilum on the mesial side. Aspiration was done on October 16th and rib resection on the 17th. Approximately one pint of thin pus was evacuated. Culture showed pneumococci. Suction drainage was started on October 19th. Temperature was normal on the 21st and did not rise again. On October 24th patient was up in wheel chair. The apparatus was removed daily and the cavity irrigated with Dakin's solution. On October 31st the apparatus

was removed, and the sinus filled with 10 per cent bismuth paste. On November 6th patient left hospital and has been well ever since. This was an average case with a large cavity yet the cavity had disappeared after eleven days of suction drainage and the patient was out of hospital in three weeks.

*Case 5.*—Female, aged thirty. Empyema followed right sided pneumonia. Rib excision was performed on January 4th by Dr. T. R. B. Nellis who was in charge of the case. Suction drainage was commenced on January 14th at which date patient still had a little temperature, a free discharge of pus and toxic symptoms. These rapidly cleared up. Suction was continued until February 5th and the sinus closed promptly with bismuth paste. Leaks in the dental dam and the drainage tube delayed this case and the apparatus did not work until these parts were replaced.

### Conclusions

1. Lung expansion after acute empyema is ordinarily effected through respiration.
2. Suction drainage is a great aid in clearing up the infection and in hastening lung expansion.
3. The suction need not be continuous.

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## A CASE OF CHRONIC NEPHRITIS TREATED WITH COLLIP'S PARATHYROID EXTRACT

BY EDWARD H. MASON, M.D.

Assistant Director, The University Clinic, McGill University and the Royal Victoria Hospital, Montreal

THE occurrence of a lowered blood calcium in many cases of chronic nephritis is well recognized. Whether this deficiency is related to hypo-parathyroidism is not known. That a parathyroid factor is present in some cases would appear from the recent report of Davidson<sup>1</sup> where the parathyroid deficiency was confirmed at autopsy. That in other cases, where there is a marked lowering of the serum calcium, parathyroid extract results in an increased amount of circulating calcium would appear from the following report.

Case No. 42586, female, aged twenty-nine years. *History of Present Illness.* In October, 1923, following the delivery of her first child in the Montreal Maternity Hospital the mother had eclampsia from which she recovered. Since then she had been obliged to void once or twice almost every night. No other symptoms have been present.

On June 16, 1925, she returned to the prenatal clinic at the same hospital for observation. She was six months pregnant, her blood pressure was systolic 140, diastolic 90 mm. Hg, and there was a trace of albumen in the urine. The next day she returned with slight vaginal bleeding. Upon examination a placenta previa was found, a bag was introduced, and the pregnancy was terminated. Throughout this manipulation there was considerable hemorrhage. During the next few days she had severe headaches with irregular vomiting. Her urine volume decreased to 200 to 400 c.c. per day. Slight generalized edema appeared. On June 25, 1925, she was transferred to the medical wards of the Royal Victoria Hospital.

*Personal and Family Histories.* Unimportant.

*Present Condition.* Temperature, 98.6° F. Pulse, 78.

Respiration 20. The patient is a well nourished young woman but very pale. At frequent intervals there is vomiting of bile stained watery fluid. There is slight edema of the legs and lower back.

*Respiratory System.* Negative.

*Cardio-Vascular System.* The pulse is regular, of small volume, but the tension is good. The heart is of normal size and at the apex a soft systolic murmur is present which is transmitted up along the left sternal border. The blood pressure is systolic 142, diastolic 88 mm. Hg.

*Digestive System.* The tongue is coated and the pharynx is reddened. The abdomen is negative.

Otherwise nothing of importance was found in the physical examination.

*Special Examinations.*—*Urine.* Acid, with a specific gravity varying from 1008 to 1010; albumen ++; no sugar; no diacetic acid; no bile; and the microscopic examination showed a few hyaline and granular casts, a few pus cells, but no red blood cells.

*Blood.* Reds, 2,400,000; whites, 14,600; Hb. 35 per cent.

*Stool.* Negative.

*Fundi.* Negative except for pallor of retinae.

*Electrocardiogram.* Slight left preponderance with normal conduction time, with a large "T" deflection.

*Blood Chemistry.* (June 26, 1925).

Urea Nitrogen:	147.3 mgms. per 100 c.c.
Uric Acid:	15.1 " " "
Creatinine:	12.0 " " "
Serum Calcium:	7.7 " " "
Plasma Chlorine:	320.0 " " "
CO <sub>2</sub> capacity:	28.6 vols. per cent

*Course of the Case.* During the next few days (June 25 to July 2, 1925, inclusive), treatment was carried on by intravenous injections of twenty per cent glucose, saline by rectum, and disodium hydrogen phosphate, eight grammes per day, by mouth. No improvement occurred. Vomiting continued, and there was almost complete anuria, with no improvement in the acidosis, and the blood calcium fell to 6.45 mgm. per cent. By July 6, 1925, the serum calcium was 5.6 mgm. per cent, marked muscle irritability appearing.

Received for publication, February 12, 1926.

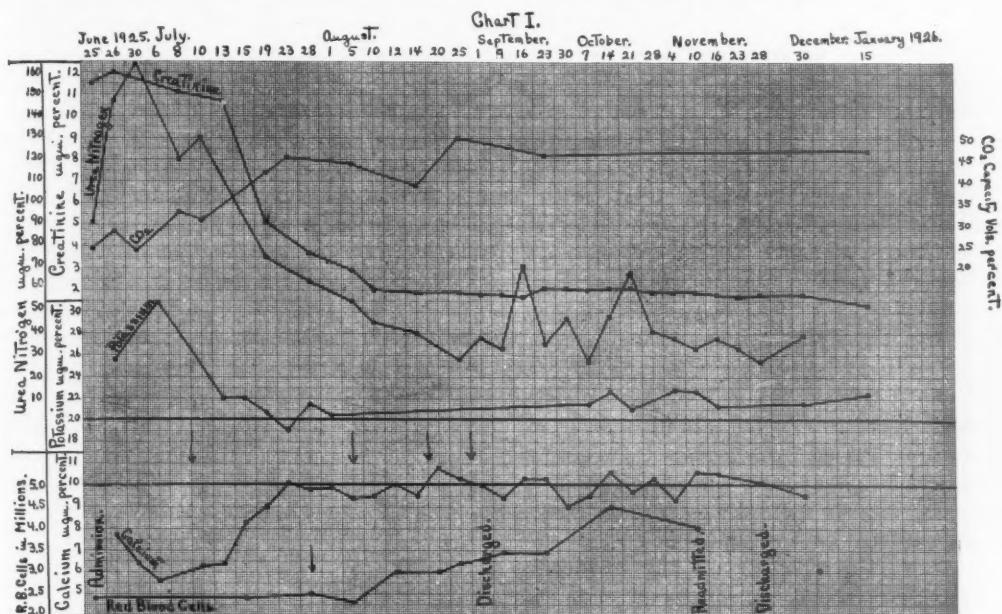
At this point all treatment stopped and Collip's parathyroid extract was started (July 9, 1925). At first 3 c.c. of the extract were given subcutaneously every twenty-four hours, the blood calcium being determined twelve hours after each injection. Later on (July 29, 1925), the same dose was given every forty-eight hours. The subsequent changes in the chemical findings are depicted graphically in Chart I.

Within two days of the institution of the parathyroid extract most of the vomiting stopped and food could be retained by mouth. The daily urine volume increased and the various chemical constituents of the blood started

to approach their normal levels. As seen from Chart I there was a progressive increase in the serum calcium which reached the normal level on July 23, 1925 (10.1 mgm. per cent). Coincidently the serum potassium fell to its normal figure, the urea nitrogen and creatinine dropped rapidly, and the plasma  $\text{CO}_2$  capacity increased.

On July 28, 1925, the general condition of the patient had improved to such an extent that a high iron diet was started. This was followed by a progressive improvement in the degree of secondary anemia (Chart I).

On August 5, 1925, the parathyroid extract was stopped without any fall in the serum calcium resulting.



Admission on June 25, 1925, with marked vomiting. July 9 parathyroid extract started; 3 c.c. (hypo) every twenty-four hours, Lot No. 1 (Collip). Vomiting stopped by July 15, and high iron diet started on July 28. On July 29, parathyroid extract changed to 3 c.c. every forty-eight hours, being continued until August 5. On August 19 the parathyroid extract was recommended, 3 c.c. every forty-eight hours, being stopped on August 28.

TABLE I

Date	Urine			Phenol-Sulphone Phthalein 2 hours	Blood Pressure		Remarks
	Maximum Sp. Gr.	Albumen	Mic. Exam.		Sys.	Dias.	
1925 June 25	1010	++	{ Hyaline and gran- ular casts A few pus cells No casts	per cent — 4.0	mm. Hg. 142 150 140	mm. Hg. 88 98 100	Admission.
July 1 July 15	1010	++	Pus + No casts Pus + No casts Pus +	17.0 17.5 18.0	124 120 130	88 68 86	Urine culture nega- tive
August 1	1016	++	No casts Pus +	—	120	80	B.M. Rate—10.5 per cent
August 15	1010	++	No casts Pus +	—	130	90	Discharged, Septem- ber 2, 1925
September 1	1010	++	No casts Pus +	—	120	80	Readmitted
November 9	1014	++	A few hya- line casts Pus +	—	130	90	Fundi: normal. Dis- charged November 28, 1925
November 15	1015	++	A few hya- line casts	—	130	90	

From August 19 to 28, 1925, it was given again, 3 c.c. every forty-eight hours.

After discharge from the hospital on September 2, 1925, the high iron diet was continued. To date there has been no drop in the serum calcium and no parathyroid extract has been given. Also the improvement in the non-protein nitrogen retention has been maintained.

It is noteworthy that the patient's maximum urinary concentration has not greatly improved (1010 to 1015) (Table I). Albumen persists in the urine to the same degree, and a few casts can be found. No red blood cells have been seen on any occasion. The systolic blood pressure has fallen a little, and no changes have taken place in the fundi.

*Discussion.*—It would appear from the above picture that the case was one of chronic nephritis of about three years duration which suffered from an acute depression of renal function associated with the termination of a six months' pregnancy.

The nitrogen retention was marked, there was a rather severe acidosis of the nephritic type, and the blood bases were upset. This was manifested by a lowered calcium and an increased potassium, the latter being considered to be compensatory. The degree of secondary anaemia was severe.

With ordinary treatment over a period of fourteen days (June 25 to July 8, 1925) no consistent improvement in the clinical state, nitrogen retention, acidosis, or base disturbance followed. In fact, the serum calcium progressively declined. On July 9, 1925, all other treatment was discontinued and the parathyroid extract was commenced. Coincidently with the progressive elevation of the serum calcium a remarkable and immediate chemical readjustment followed. This resulted in a corresponding clinical improvement.

The fact that with the temporary discontinuance of the parathyroid extract on August 5, 1925, there was no drop in the serum calcium, is of interest. Also, from August 28, 1925, to date no parathyroid extract has been given, and the serum calcium has maintained a normal level.

The degree of residual renal disturbance still remaining is evident from Table I and Chart I, showing that there has been no appreciable change

One thousand volunteers, who can be called upon to give their blood in transfusion cases, are being enrolled by the London Blood Transfusion Service, a little known branch of Red Cross work. This service to London hospitals was organized five years ago because doctors found it so difficult to obtain blood of the right type when a transfusion was necessary to save a pa-

during the past five months (September, 1925, to January, 1926).

Why, in severe exacerbations of chronic nephritis, the serum calcium frequently falls is not thoroughly known. Undoubtedly in some cases it is largely a matter of upset in the balance between absorption and urinary and intestinal excretion. That the fall may be marked enough to produce symptoms of tetany is also generally recognized, and if acidosis of any degree is present, it increases the percentage of total calcium which is in an ionized state, thereby protecting against the symptoms of tetany until the serum calcium has fallen to a lower value. In other cases the fall in the blood calcium may have a relation to hypoparathyroidism, but such an assumption I do not think to be necessary to explain the findings in this case. It is most likely that the parathyroid extract increased the mobilization of calcium from the body's depots, mainly the bones. For the proof of this statement, study of the calcium balance before and after the administration of parathyroid extract would be necessary.

#### Conclusions

A case of chronic nephritis, suffering from an acute depression of renal function, treated by parathyroid extract is reported.

Coincidently with the administration of the parathyroid extract the serum calcium returned to its normal level with a remarkable readjustment of the altered blood chemistry.

It is suggested that the parathyroid extract functioned through causing an increased mobilization of calcium from the body's depots.

I wish to acknowledge Professor Collip's kindness in giving us the extract used in treating this case. Due to its early production it was not standardized in units.

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tient's life. The blood of each human being belongs to one of four chemical types, and an individual who is willing to transfer some of his blood can be used only if he has blood like that of the patient. The organization states that calls come in at all hours of the day and night. It has its members classified according to blood type.—*Science*, Nov. 20, 1925.

## A CASE OF STATUS EPILEPTICUS (TRAUMATICA) OPERATION—RECOVERY\*

By HERMANN M. ROBERTSON, C.B.E., M.D., C.M., M.R.C.S. (ENG.),  
F.R.C.S. (Ed.), L.R.C.P. (LOND.), F.A.C.S.

*Victoria, B.C.*

EPILEPTIFORM convulsions, whether of the general or localized (Jacksonian) type, present problems for diagnosis covering the entire field of medicine. This paper, however, will deal only with convulsions arising from intracranial changes following direct injury to the cranium or its contents.

*Incidence.*—It is interesting to note the frequent incidence of epileptic attacks following head injuries. Sharpe,<sup>1</sup> of New York, in a series of 487 patients having acute brain injuries reported convulsions, or even localized twitchings, occurring in only twenty-seven cases. Frazier and Ingham in a series of 176 cases of gunshot wounds of the head reported twenty-eight cases in which convulsions occurred during the first year. Block<sup>2</sup> reported fifty cases of traumatic epilepsy, in which forty were due to war injuries, and seventeen to artillery and explosive bullets. In these cases, only two of status epilepticus occurred. Voss,<sup>3</sup> in 1917, reported one hundred cases of head injuries. His recent article (1921) is a review of his previous cases at the expiration of three years, with forty-three additional cases treated during the past year. Out of one hundred cases, thirty-seven were definitely epileptic. Of the forty-three new cases, nineteen had convulsions. His statistics also appear to show that the percentage of attacks varies with the region of the brain involved. Thus in 116 cases of injury in the parietal region fits occurred in 56 per cent, whilst in 110 cases in which the other remaining portions of the brain were injured, only 34.5 per cent had convulsive seizures. This author could give no estimation of the value of surgery as the interventions had been varied and many operations had been performed in the field. Gordon<sup>4</sup> of Philadel-

phia, in a series of thirty-three cases, of which eleven were frontoparietal, nine parieto-occipital, five temporal, and eight frontal, states that Jacksonian attacks occurred in one-third of the cases, whilst twenty-two were of the generalized type in spite of the unilateral lesions. His cases presented a variety of anatomical lesions—haemorrhage, destruction of cerebral tissue, pressure of fragments on cranial bones and cicatricial tissue.

*Etiology.*—The exact cause of epileptic attacks following trauma of the brain is not always evident, as an injury in a certain group of cases may be accompanied, or followed, by epileptic seizures, and in another be totally free from such manifestations. Hence we are led to admit that besides the trauma itself, and lesions within the cranium and the cerebrum, there are other endogenous and exogenous circumstances and factors that participate in the development of epilepsy in all traumatic cases.

The presence of toxic states of alimentary origin acting as a predisposing cause of seizures in an already existing epileptic is a fact well known to the clinical observer. Intoxication of any origin is another important causative factor. Furthermore, some authors consider that an epileptic attack is an anaphylactic crisis due to abnormal proteins which enter the organisation in cases of dysthyroidism.

Among exogenous factors are insolation, electrical irritation and psychic trauma. Apparently several elements may play a definite rôle in the causation of epileptic seizures:

1. The trauma by means of small or diffuse structural, molecular, or vascular changes in the cerebrum.
2. Elements of a biochemical character.
3. The existence of a central nervous system which is fundamentally predisposed to irritative phenomena by virtue of a special or family morbid characteristic (Gordon).

Bing<sup>5</sup> speaks of a reflex epilepsy following wounds of the extremities, trunk or head, in

\* Read at the annual meeting of the North Pacific Surgical Association, at Spokane, Washington, on December 12, 1925.

which attacks are induced by sensory aura originating in a scar left behind by a trauma. Pressure on such a scar (which is denominated an "epileptogenetic zone") may produce an attack. Excision of the scar or removal of any other pathological condition present may do away with these reflex epileptic attacks. He thinks that material alterations of the cerebral cortex lie at the basis of epilepsy, though they are here and there too slight to be discovered by histological methods. Alzheimer, in many cases of genuine epilepsy has shown marginal gliosis of the cerebral cortex with numerical reduction of the medullated fibres and ganglion cells; the vessels proliferated show thickened walls, sometimes also lymph sheaths filled with mast-cells. Patients who have died in ordinary epileptic attacks or in status epilepticus present severe acute changes in the ganglion cells and their axis cylinders, besides amoeboid glia cells loaded with products of disintegration. Donath concludes, after experimenting upon animals, that certain substances introduced into the circulation can cause epileptic paroxysms; but he concludes that the organic bases resembling ammonia, (trimethylamin, cholin, creatinin and guanidin) act as convulsants. He therefore believes that in epileptics, the occasional accumulation of substances of this sort in the blood irritate the morbidly constituted brain to react by epileptic attacks.

*Pathology* in traumatic epilepsy depends upon the kind and severity of the injury sustained. The skull may have been fractured by a fall, or a blow on the head by a blunt or sharp instrument—all of which may produce depressions of the skull, splintering, the driving of fragments into the brain substance, the tearing of the meninges attended by haemorrhage, the formation of exostoses, the development of cysts, the introduction of pus germs leading to abscesses, and the formation of scars which produce pressure.

When the calvarium is opened, we may find some of the conditions just mentioned. Even the meninges may be adherent, and growing down through them into the brain substance, trabeculae of connective tissue. The cortical cells in the wounded area may be entirely destroyed and replaced by an increase in the

connective tissue, or nerve cells may have undergone various degrees of degeneration.

In focal epilepsy, the pathological findings are more characteristic and better localized than in the general types of traumatic epilepsy.

The case I have to report is as follows:

Male, aged forty, merchant, first seen March 21, 1923. About eighteen years ago at Ladysmith, B.C., whilst working in a mine, he sustained a severe crushing injury to his head, as a result of which he lost the right eye, and sustained compound comminuted fracture of the skull over the right frontal bone. He was a long time in recovering from the injury and states that the wound continued to discharge pus for about three years; that he had never been quite right since; and frequently complained of a little pain in the head over the site of the injury. He could not give much information as to what treatment was carried out at the time of the accident.

Convulsions for the first time occurred about two years ago, and recurred, on and off since. Whether or not they were generalized or focal cannot be ascertained.

On March 10, 1923, his headache (from which he had suffered from time to time) increased in severity; especially over the original site of injury.

On March 21, he was first seen in a general convolution, and after recovery still complained of headache. His temperature was normal. A purgative was prescribed, and a mixture containing the triple bromides with sodium baborate was given. The convulsive seizures did not respond to any form of medication, even morphine; and on March 23rd he was admitted to St. Joseph's Hospital at 6 a.m. when his condition was noted as follows:

A strong, healthy looking man, well developed, temperature normal, pulse rate varied as epileptic attacks recurred frequently. The right eye had been lost eighteen years ago. Above the right eyebrow, in the region of the frontal eminence, was an irregular scar which appeared slightly reddened, was tender and occupied an area about the size of a fifty-cent piece. There was no oedema over this and no particular tenderness. One could, however, feel a distinct depression in the skull under the scar. Generalized convulsions were recurring with great frequency in spite of all treatment. Lumbar puncture was immediately performed, and the spinal fluid, which was under considerable pressure, showed a cell count of 4; cultures after three days' incubation were negative.

X-ray of the skull showed a large aperture in the frontal bone on the right side about one and three-quarter inches long in its vertical plane, by three-quarters of an inch long in the frontal direction. The outer edge of this gap showed a thickening running backwards into the cranial cavity. The antero-posterior view showed this also as a distinct ledge of bone running in a vertical plane along the upper half of the aperture and on its outer side. All other systems apparently normal.

On March 24th he was in a serious condition as his convulsive attacks were numerous with only a short interval between them, sometimes only five or six minutes. Between the attacks he did not regain consciousness. The left arm and leg were particularly involved (typically Jacksonian), but the right side remained more or less quiet. The head was turned to the left side, and the left eye turned upwards and outwards during the attacks. From the time of admission to hospital at 6 a.m. on March 23rd until he was operated upon at 11.30 a.m. March 24th, the nurse in attendance reported that he had about 117 convulsive attacks. Prior to admission he must have had at least a dozen, so that 130 convulsions would be a conservative estimate.

At operation a flap was turned down, and it was found that the aperture in the skull would barely admit the end of the little finger. There were dense adhesions of the scalp over this gap, and in attempting to separate the *Cura mater* together with scar tissue from the edges of the aperture there was a sudden escape of a considerable amount of clear fluid which was under pressure—apparently a cystic formation.

With considerable difficulty the dura was eventually freed all round. Dipping down into the brain substance was a spicule of bone about one and a half inches long, and a quarter of an inch broad, lying in a vertical plane along the upper half of the aperture on its outer side as originally shown in the x-ray. This was removed with Rongeur forceps, also as much scar tissue as possible. The edges of the *dura mater* could not be approximated. No attempt was made to cover the defect with foreign substance. The flap was sutured into position and the patient returned to bed.

His convalescence was normal, the wound healed promptly, and no further convulsive attacks have occurred to date—two years and nine months.

**Treatment.**—This case was unique and demonstrates at once the value of surgical treatment, without which nothing could have been done as the symptoms were entirely due to an organic condition, and the man would have eventually collapsed. In Sharpe's<sup>1</sup> opinion, post traumatic epilepsy is a most discouraging one from an operative standpoint, in that it is usually the result of a condition which could have been relieved at the time of the primary cranial injury, and these epileptiform convulsions could have been avoided.

All depressed fractures of the vault should be elevated at once, for if permitted to remain until epilepsy of either the localized Jacksonian or of the general convulsive type occurs, it is then frequently too late to obtain a good result. A cranial operation at a late date may be followed merely by a temporary cessation of the spells.

As far as technique is concerned, Marburg is of the opinion that it does not make much difference what is done to prevent adhesions by way of inserting foreign materials. Dowman,<sup>6</sup> of Atlanta, in a recent article, advocates the injection of 95 per cent alcohol into the epileptic zone which has been mapped out with a Faradic stimulus. He quotes two cases, in the first of which, done March 26, 1924, a cystic tumour containing 165 c.c.'s of yellow fluid had been removed from the temporal lobe; the cavity had been filled with Zenker's fluid. There was considerable collapse of brain tissue. Many Jacksonian attacks of status epilepticus involved the left side of the face and produced conjugate movements of the eyes and the head to the left. On April 6th, the cavity was again exposed, and

the facial area marked out with Faradic current. With a small hypodermic five minims of 95 per cent alcohol were injected into the area very slowly so that the cortex assumed a cooked greyish appearance. In the first four hours following this there were three to four slight convulsions. The patient regained consciousness, and began to talk. For twenty-four hours there was a paresis of the left facial movements and of the conjugate movements of the eye. The paresis was completely gone in three days, and there were no more fits. Dowman<sup>6</sup> was of the opinion that the fits were caused by the irritating effect of the Zenker's fluid upon the brain tissue. He thinks, furthermore, that chronic oedema of the brain has something to do with the causation of convulsions.

#### Summary

1. Epileptic attacks may follow a head injury when no fracture is present or even suspected, due to adhesions of the membranes, cortex and bony structures.

2. Convulsive fits occur more frequently following depressed fractures of the vault—this being due to small cortical haemorrhages, or lacerations followed by cicatricial adhesions.

3. The etiology of epileptic attacks following trauma of the brain is not always evident. It is possible there are other factors involved besides the trauma, such as toxic states of alimentary origin and the existence of an already unstable central nervous system. Sharpe is of the opinion that chronic oedema of the brain from increased intracranial pressure is an important factor.

4. The treatment of status epilepticus is essentially surgical in cases of definite history of brain injury, and the procedure to be followed will depend upon the condition found at operation.

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## THE TREATMENT OF DIABETES MELLITUS, WITH AND WITHOUT INSULIN\*

BY GARFIELD G. DUNCAN, M.D., *Resident Physician,*

*The Physiatric Institute, Morristown, N.J.*

IT seems almost necessary to begin a paper on diabetes mellitus with an apology. A great literature has accumulated on the recent advances which have modified our treatment, and it would seem that enough had already been said and written on this subject. But I must point out that recent figures indicate a return of the diabetic death rate to levels equalling those of pre-insulin days. To those of us who are familiar with scores of patients who were kept alive by undernutrition until insulin was available, and who are now in perfect health, this fact is almost incredible. One can only conclude that the majority of diabetics are not receiving efficient treatment. My aim in this paper is (1) to discourage lax methods of treatment, (2) to stress the importance of the proportionate makeup of the diet, and (3) to outline the practical management of diabetes employed at this institute.

To review briefly the scientific dietetic management in this country and Canada, we have Woodyatt's<sup>1</sup> treatment based on the principle that the internal pancreatic function is affected by glucose only. His diets are low in carbohydrate with moderate restrictions in the protein, on account of its theoretical glucose value. To prevent undernutrition liberal amounts of fat are allowed. In this he differs from Allen and Joslin who depend to a great extent upon undernutrition to increase the tolerance. The Newburgh and Marsh<sup>2</sup> diets have a relatively high fat content, although recognition of the advantage of initial undernutrition is shown in their treatment. Chief among the high fat supporters in Europe are Naunyn<sup>3</sup> and Petren<sup>4 & 5</sup>. They lay particular stress on the necessity of rigid restriction of protein as well as carbohydrate, allowing an extremely high fat content and occasional fast days.

\* Delivered before the Geneva Academy of Medicine, N.Y., September 9, 1925. Two experiments completed since that date are included in this paper.

Allen<sup>6 & 7</sup> has experimentally shown the benefits of undernutrition and its advantages over diets which are directed against it. His doctrine maintains that essentially the tolerance is affected by the total caloric value of the diet, and that the insulin requirement is governed not only by the carbohydrate and protein, but also by the fats. In the same work he demonstrates clearly that while the carbohydrate tends most readily to cause glycosuria, protein is second, but not to the degree of its theoretical glucose equivalent, and fat has much greater effect on the plasma sugar level than its supposed glucose value would account for, due he thinks to its caloric value rather than availability as a source of glucose. Allen has many times pointed out that fat is slow in manifesting its harmful influence.

This effect is particularly striking. It has provided the most frequent cause of increase of the insulin dosage in 64 cases which have been under observation and treatment since August 1, 1924. In this group of patients we have not included those who are now in the institute, those discharged too recently for a check-up, those who are known to break diet habitually, those who on account of distance or abandonment of treatment have not returned for tests, those who have died in the institute or outside from advanced complications, those who were discharged before the diabetes was under control, and those who give a history of any infection or intoxication since discharge, which might have affected the insulin dosage.

Of the 64 cases, 39 showed a decreasing insulin requirement, 2 discontinuing its use. Eight showed an increase and 17 were unchanged since discharge. Of the eight now taking more insulin than on leaving the institute, four (Nos. 1914, 1940, 1874, and 1352) were on high fat diets, three showed a considerable increase in body weight, and the remaining patient had re-

ceived a diet increase from 1,000 to 2,400 calories.

Temporarily there is a saving of insulin by a high fat diet. It is only after several months that we find that the insulin requirement instead of decreasing has gradually increased to a level as high or higher than when the diet was more liberal in carbohydrate and protein with the same total calories. Insulin has made it possible to study high fat diets experimentally and to obtain positive proof of certain facts which are not in keeping with the theory upon which these diets are based. It was with this view in mind that a group of patients were allotted certain diets, with subsequent alterations designed to show clearly the effects of the different food components on the tolerance and insulin requirement.

Probably the best illustration, taking into account fidelity, uniformity of weight and the absence of intercurrent infection, is found in case No. 1940, a male Hebrew, twenty-one years of age, who has been continually under our close observation for thirteen months. The body weight remained stationary between 108 and 110 pounds throughout the experiment. A diet of 70 gm. protein, 80 gm. carbohydrate and 1,600 calories, with 60 units of insulin daily (131.7 gm. available glucose; 60 units = 2.1 gm. per unit) controlled the diabetes from October 6, 1924, until October 19, 1924. We then reduced the carbohydrate and protein to 30 gm. each, keeping the total calories unchanged. The insulin was reduced to 14 units daily (62.5 gm. available glucose; 14 units = 4.4 gm. per unit) with moderate hyperglycemia resulting but not to the extent of causing glycosuria. As it was desirable to have the body weight remain constant owing to its known influence on the insulin requirement, on November 30, 1924, we increased the total calories to 1,800 by adding fat. There was a gradual increase in the insulin dosage to 46 units a day, (67.4 gm. available glucose; 46 units = 1.4 gm. per unit). On March 1, 1925, the protein was increased 10 gm. (40 P., 30 CH., and 1800 cal.) with total calories unchanged, making the necessary reduction in fat. Five days later (March 6, 1925) he had a hypoglycemic reaction. The insulin was reduced to 44 units. This would indicate, if we could discount a gain of tolerance, that calorie for calorie the protein affected the plasma sugar less than

the fat. A further increase of the protein by 10 gm. (50 P., 30 CH., and 1800 cal.) was made on March 10, 1925. The carbohydrate and total calories remained unchanged. Neither glycosuria nor hyperglycemia ensued and there was no change in the insulin dosage. On June 15, 1925, a 10 gm. increase was made in the carbohydrate, with protein and total calories unchanged. Neither glycosuria nor hyperglycemia followed and there was no change in the insulin requirement. A further addition of 10 gm. of carbohydrate was made on June 22, 1925, and repeated on July 7, 1925, with no subsequent change in our objective findings. On August 14, 1925, a protein increase of 10 gm. was made (60 P., 60 CH., and 1800 cal.) The succeeding day he had a hypoglycemic reaction followed by a further reduction of the insulin dose by two units. This diet was constant with a stationary insulin dose until September 9, 1925, when the protein was increased to 70 gm. On September 16, 1925, the carbohydrate was raised to 70 gm. (70 P., 70 CH., and 1800 cal.) and maintained until September 22, 1925. There was no glycosuria nor hyperglycemia and the insulin remained the same, 44 units. The protein and carbohydrate were reduced on September 22 to 30 gm. each, the total calories remaining unchanged. As a precautionary measure we simultaneously lowered the insulin to 34 units. The dose was gradually increased in answer to a rising plasma sugar, until on October 16 it was 52 units, with a plasma sugar of .218 per cent (Benedict), and moderate plasma acetone (Rothera-Wishart) and heavy acetonuria. Without any change in the amount of insulin the diet was rearranged to allow 70 gm. protein, 70 gm. carbohydrate and 1800 calories. In four days the plasma sugar was normal and the urine free from acetone. These findings have been constant as has the insulin dosage, 52 units, up to the present date (December, 1925), (124.3 gm. available glucose; 52 units = 2.3 gm. per unit). It would seem that this particular patient is very susceptible to acidosis on a high fat diet. Furthermore the transient acidosis seems to be the only explanation for the maintained higher insulin dosage.

Case No. 1874, an active fireman, fifty-six years of age, was allowed on December 12, 1924, a diet of 45 gm. protein, 30 gm. carbohydrate and 2400 calories. He required 40 units of insulin daily to prevent glycosuria. There was moderate hyperglycemia. Increasing

amounts of insulin were required until February 3, 1925, when he was getting 58 units. On this date, to answer the needs of heavier work, we increased the total calories to 2600 by adding fat alone. The body weight remained constant between 143 and 145 pounds. Following the increase of fats the insulin was increased gradually to 64 units. By March 20, 1925, the insulin had been increased to 68 units, and April 14, 1925, to 84 units. On May 2, 1925, after five months on the high fat diet he had symptoms of a hypoglycemia, necessitating a reduction of four units. This would make one think that the full and delayed insulin requirement of the high fat diet had been reached.

Several succeeding analyses warranted further reduction of the insulin. He was readmitted for a "check-up" on September 12, 1925. The diet was the same with 72 units of insulin daily. There was no glycosuria and the plasma sugar was .157 per cent. An increase of 10 gm. of carbohydrate and protein on September 15 and 18 respectively made no change in the plasma sugar or insulin requirement. On September 20, 1925, by lowering the total calories to 1800 and increasing the carbohydrate and protein to 100 gm. each, we were adding to the previous diet the theoretical equivalent of 86.10 gm. glucose in exchange for 135 gm. fat or 13.5 available glucose. A temporary increase of the plasma sugar from .146 to .164 per cent ensued. The total insulin dosage remained the same. Subsequent tests on exactly the same régime have revealed a constantly normal plasma sugar.

Realizing that individual cases such as these might in part be duplicated where there is an active focus of infection or increase of weight with lack of muscular exercise, special efforts were made to exclude these disturbing factors. I have attempted to present these two cases, not as individual reports but as illustrations of the group of cases whose insulin requirements have gone up following discharge, namely, those on high fat diets. To fail to follow up a "high fat patient" until the full effect of the fat has been realized, e.g., when the insulin dose remains stationary with no hyperglycemia, is leaving the treatment incomplete. An insulin dosage which is not sufficient to maintain a persistently normal plasma sugar merely makes a severe diabetes appear mild. It does not prevent the progressive tendency of the disorder or safeguard the patient from complications. There is no standard rule of insulin dosage. Each patient has a different requirement and this is subject to change under different conditions.

These two cases illustrate:

1. *The insidious aggressiveness of fat.*—The initial low insulin requirement gradually increasing until the full effect of the fat is manifested might explain why Petren's patients improved while in the clinic but after discharge the well-known effect of excessive fats on the tolerance asserted itself. His follow-up statistics<sup>5</sup> show that of 88 patients with severe dia-

betes treated from the beginning of 1914 to the end of 1921, only 16 are now living. Of the 72 deaths there were 17 attributed to causes other than diabetes. Eighty-one and eight-tenths per cent of the total cases is a percentage of fatalities far exceeding that of Newburgh<sup>8</sup>, who reported 14 per cent of deaths among 122 cases under observation from March 14, 1918, until January 1, 1922, (23 of the total 145 having been lost from observation are not included here). Allen and Sherrill<sup>9</sup> reported 62 deaths (12.9 per cent) out of 480 cases, up until January of 1922 for the three preceding years. This includes 168 who were unfaithful to their diet and who subsequently provided 49 of the 62 deaths, in other words 79 per cent of the total deaths. Of the 312 faithful there were only 13 deaths or 9.9 per cent.

2. *That eventually there is no saving of insulin by high fat diets.*—The diet of 30-30-1800 calories in the first case required 46 units of insulin daily, while there was no hyperglycemia with 42 units when the diet was 60 gm. p., 60 gm. carb. 1800 calories. In Case 2 (No. 1874), 45 gm. protein, 30 gm. carbohydrate and 2400 calories required 72 units of insulin while 100 gm. protein, 100 gm. carbohydrate and 1800 calories caused practically no change in the plasma sugar level with the same amount of insulin.

There is no doubt that a gain of tolerance may explain this in part, but it is interesting to note that in Case 1 the insulin dosage was being gradually increased until part of the fat was substituted by protein, and then it became stationary. With a further substitution there was a decrease in the insulin dosage. It would seem that the fat content of the diet influences the insulin requirement out of all proportion to its supposed glucose equivalent. This has been more conclusively proven by previous publications<sup>6 & 7</sup> from this institute.

3. *The certainty that the insulin dosage cannot be reckoned according to the actual and theoretical glucose value of the diet is further confirmed.*

*Treatment.*—The practical treatment as adopted at the institute may be spoken of under two heads, first, dietetic without insulin, and second, dietetic with insulin. The majority may still be successfully treated without insulin. On the other hand, for some it is essential.

For patients who are overweight it is desir-

able to restrict the total calories as well as the carbohydrate content. Reduction of body weight by this means has been repeatedly proven prior to and since<sup>9</sup> the use of insulin to be the most powerful dietetic measure in controlling symptoms by lessening the functional overstrain on the pancreatic islands. The same principle is still employed in such cases when complications such as acidosis or infection are present, but insulin can now be employed in addition. We seldom restrict the protein below 60 gm. or the carbohydrate below 40 gm. The total calories vary from 600 to 1000 where rapid reduction is desirable.

More liberal allowances of both protein and carbohydrate with 1200 to 1400 calories are given if only slight undernutrition is needed. On the more rigid of the two diets an apparently severe diabetes in an obese patient usually proves to be mild when the body weight is reduced to normal or slightly subnormal levels. The more obese the patient the better the outlook for controlling the disorder by undernutrition alone. As the body weight is reduced and the tolerance regained the diet is increased as circumstances permit, until the permanent diet is one which will maintain a constant body weight within the desired limits, with the urine constantly free from sugar and the plasma sugar normal. If these objective findings are not realized we then resort to insulin. When gain of weight is desirable, as in most of the more advanced cases, we use insulin in combination with liberal diets from the outset, such as 80 gm. protein, 80 gm. carbohydrate and 1800 calories.

In the uncomplicated cases one cannot go astray by directing the diet solely according to the physical status of the patient. The overweight may be reduced and the diabetes with symptoms controlled by a low diet. The emaciated may be built up in weight with a liberal diet plus insulin. Once more he or she may enjoy being a normal person to all intents and purposes. The inconvenience of the diet and insulin should be the only reminder of the diabetes.

Unfortunately the misuse of insulin is common. Too small doses, saving patients from the possibility of hypoglycemic reactions, do not prevent hyperglycemia and often glycosuria. There is then continued excessive functional strain on the pancreatic islands with progressiveness of

the disorder and consequent increasing need for insulin. There is also the ever existing susceptibility to complications.

When the "diet-insulin balance" is established, that is, a diet which keeps the body weight at the desired level with a certain dosage of insulin, the plasma sugar normal, urine free from sugar, and the patient free from symptoms, a subnormal blood sugar is the only indication for a reduction of the insulin dose. The return of tolerance may be gradual or sudden. The reduction will be guided by the severity of the reaction, 2 to 8 units. This reduction should be made from the dose corresponding in time to the one which preceded the hypoglycemia. Low blood sugar reactions in a patient who has been established on an accurate "diet-insulin balance" may be attributed to increased tolerance following first, accurate control of the diabetes, second, clearing up of foci of infection, third, further loss of weight due to a low calorie diet, fourth, increased muscular exercise. In reducing the insulin it is not a question of how little one can give but rather how much can be given without a reaction. In this way the maximum of rest is provided for the internal pancreatic function.

When insulin therapy is decided upon, the initial dosage will vary in amount and distribution with the severity of the case. To those who may need only one dose we usually give 8 to 10 units as a beginning, the customary time being one-half hour before breakfast. This may be increased to 20 units or thereabouts and if more is needed, a two-dose régime should be started. The second dose may be given one-half hour before supper at the expense of the morning dose (14 and 12). These may be further raised, and if the severity of the diabetes calls for more than 36 to 40 units daily it is well to institute a midday dose. The difficulties of hypoglycemic reactions during the day with hyperglycemia in the morning, especially in those patients requiring large quantities of insulin, has been largely overcome by Allen's "early and late" programme<sup>10</sup>. In this, the morning dose is given about one hour before breakfast, and the evening dose one or several hours after supper. The time of the noon dose remains unchanged. When this plan does not suffice, a small midnight dose may be given temporarily until the tolerance

permits the adoption of one of the above schedules.

**Complications.**—In dealing with acidosis, moderate undernutrition with the calories made up almost entirely of carbohydrate, together with large insulin doses, save all but the most advanced coma cases. While the acidosis persists huge doses of insulin may be necessary. On this account it is wise to keep the insulin well balanced with glucose. A change from a hyperglycemia to a hypoglycemia may manifest scarcely any signs in the comatose patient. Purgation and forcing of fluids are important. The exact value of bicarbonate of soda is disputed. In small doses it does seem to be beneficial when there is deficiency of alkali. Heart stimulants are of slight value.

Infection is most readily overcome by controlling the diabetes with moderate undernutrition and the necessary quantities of insulin, in addition to the usual procedures indicated in non-diabetics. Exception is made to this rule when the offending organism is the tubercle bacillus, by making the diet a high calorie one.

In the great majority of cases with gangrene where the involvement is superficial only, the circulation may be restored by elevating the foot, applying heat, and controlling the plasma sugar by moderate undernutrition and insulin if necessary. Radical surgery is indicated, on the other hand, if there is actual tendon or bone

destruction. Amputation below the knee has been favoured with more success since insulin is available, but even yet if the popliteal circulation does not give every indication of being good there should be no hesitation about removing above the knee. Time should not be wasted and the patient's resistance worn out by toe, partial foot, or foot amputations. Unfortunately we still see just this sequence of events, and if the patient survives, higher amputations are eventually arrived at.

In conclusion, if the diet management adopted by the medical profession finds its basis in conclusive scientific demonstrations, if insulin when indicated is used in sufficient doses and proper distribution to obtain the best results, and if conservative and radical surgery are used in their proper places, the death rate from diabetes will actually be decreasing and the necessity for dietetic controversies will be ended.

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**Liver Function Tests.**—A comparative study was made by Samuel S. Berger, Milton B. Cohen and J. J. Selman, Cleveland, of five liver function tests in 100 clinical cases: the Van den Bergh test; the Widal test; Roesnthal's test; the examination of urine for urobilin and urobilinogen and the Hay test for the determination of bile salts in the urine. These tests represent different functions of the liver. Any one or more or all of these functions may become impaired. Again, one or more of these functions may escape injury. Therefore the various tests do not give parallel results. When the authors attempted to separate clinical cases into groups of liver disease or no liver disease by means of any one of these tests, unsupported by other clinical evidence, they were unable to do so. When all the tests were positive, they were

dealing with liver disease, clinically of the most severe type; namely, toxic jaundice. When all tests were positive except one, namely, four positive and one negative, clinical liver disease was present, usually of a chronic type, such as that seen in Banti's disease or pernicious anaemia and cirrhoses. In every case in which all the tests were positive except the Widal, there was obstructive jaundice due to tumour. When only three tests were positive it was impossible to correlate the findings with the clinical picture, as there were many cases in which liver disease was suspected which did not give positive reactions to more than one or two tests and, conversely, there were many cases in which liver disease was unsuspected which gave as many positive results.—*Jour. Am. Med. Ass.*, April 10, 1926.

## PYELITIS IN INFANCY—A PATHOLOGICAL STUDY\*

BY BRUCE CHOWN, M.D.

*Children's Hospital, Winnipeg*

THE exact pathology of "pyelitis in infancy" has never been established beyond question. The early writers<sup>1, 2, 3</sup>, did not record complete autopsies, and apparently drew their conclusions from insufficient evidence, but the *dictum* of such outstanding men was accepted without question and the conception of a primary inflammation of the pelvic mucosa came into being. In 1909 McDonald<sup>4</sup> described in great detail the pathological findings in two cases of colon bacilluria and pyuria occurring in infants under one year of age. He found focal and diffuse suppurative lesions of the kidneys, associated with doubtful catarrhal changes in the pelvis and ureters, and still less in the bladder. These are the first complete descriptions on record. However McDonald looked upon these as exceptional cases, and missed their true significance. The following year Thiemic<sup>5</sup> in a more extensive material found the same kidney lesions that McDonald had, but he drew the conclusion that the essential lesion in "pyelitis" is a suppurative nephritis. Unfortunately he did not study his cases bacteriologically and on this ground his findings have been considered inconclusive. Wieland<sup>6</sup> in 1918 and Rhonheimer<sup>7</sup> in 1919, while not recording any detailed autopsy reports, stated that their experience had been practically that of Thiemic. Helmholz<sup>8</sup> made serial sections of the pelvis in cases of clinical pyelitis without being able to demonstrate any inflammatory lesion. There are a few reports of single cases<sup>9, 10, 11, 12, 13</sup>, none of which are complete, and in none of which was an inflammatory lesion of the pelvic mucosa demonstrated. Cabot and Crabtree<sup>14</sup>, in discussing non-tuberculous kidney infection, mentioned the case of a girl who, at autopsy, showed apparently a true pyelitis without kidney involvement. This is the only case on record of simple pyelitis in an infant verified by microscopic examination.

In view of this paucity of evidence as to the existence of a commonly diagnosed condition an investigation was undertaken. The data was

taken from the records of the Departments of Pædiatrics and of Pathology at Johns Hopkins Hospital for the years 1911 to 1924†. All fatal cases of infants of two years or less on whom the diagnosis of pyelitis, pyelonephritis or pyelocystitis was made before death, and on whom post mortem examinations were made, or in whom the condition was first found at autopsy, were reviewed. Twenty-nine cases were found in which pyuria was present at the time of death. Of these, twenty-one were classed as acute or subacute, and four as chronic. In four no lesion was found as the source of the pyuria. Several cases that had recovered from their pyuria and who died later of other causes were investigated, and one reported in detail. In these no residual lesion was found.

The following were the essential findings in the acute and chronic cases:—

1. In one case there was a definite acute inflammation of the pelvis. In this case there was also an acute, multiple, focal, suppurative nephritis.
2. In no other case was there definite pelvic inflammation, though in some there appeared to be some slight increase in the mononuclear cells of the peri-pelvic tissue. This point was not controlled by comparison with cases in which pyuria had been absent. In all the cases with any urinary tract lesion there was definite interstitial, suppurative nephritis.
3. In one case there was gross cystitis with apparent blocking of one ureter, and also an interstitial nephritis.
4. The lesions were usually bilateral, but with a tendency for more severe ones to occur on the right side. Where the lesion was unilateral it was more frequently right than left sided.
5. In fifteen cases the urine was cultured, in all of which a bacillus of the colon group was recovered.
6. There was evident infection elsewhere in most cases. This was more frequently parenteral than enteral.

\*From the Harriet Lane Home and Department of Pædiatrics of the Johns Hopkins Hospital.

This article is a summary of one which will appear in *extenso* in another journal at a later date.

†I wish to express my thanks to Dr. John Howland and Dr. W. G. MacCallum for placing these records at my disposal.

7. The cases were equally distributed between the two sexes.

In view of the almost complete absence of evidence for the existence of any such pathological entity as simple pyelitis in infancy it is urged that the term be dropped. Further, there seems little more justification for the substitution of the term "pyelonephritis." The disease most commonly causing pyuria in infancy is a suppurative nephritis, and should be so termed.

The gross appearance of the kidney in this disease varies according to the stage of the disease at which the patient dies. In the earliest cases the kidney, both externally and on section, may appear normal or slightly congested. The pelvis is normal. At a later stage one finds the kidney swollen and congested. The degree of swelling is extremely variable, and may be scarcely noticeable, certainly not clinically appreciable. The outer surface usually shows many small, greyish white or yellowish white, flat or slightly depressed areas surrounded by a zone of haemorrhage. The cut surface bears similar lesions both in the cortex and in the medulla, with some linear ones stretching through the pyramids. The pelvis is normal. In the next stage actual abscesses are found on the surface and in the substance. Finally, in the chronic cases one finds a somewhat swollen kidney with a slightly adherent capsule, and with necrotic or suppurative foci as in the previous cases. There are certain cases which run their course without foci becoming visible to the naked eye. In these the kidney is usually swollen, soft and somewhat congested, and on section the surface is greyish and slimy.

Microscopically, one sees in the earliest cases minute focal accumulations of cells, mainly polymorphonuclear, in the interstitial tissue of the cortex or medulla. Pus cells are also found in the collecting tubules. The pelvis is normal. Later the foci enlarge, some extend in linear fashion between the tubules of the medulla, there is diffuse infiltration and tubular degeneration. Different cases show great variations in the degree of focalization, in some the inflammation being mainly focal, in others largely diffuse. At this stage the pelvis is still normal. Later still there may be true abscess formation, the abscesses draining by way of the tubules into a normal pelvis. Finally, in the chronic cases, those in which there has been a pyuria perhaps for months, one finds all combinations of the above lesions, and in addition there are areas of loss of structure which are being

invaded by fibroblasts. And still the pelvis is normal.

The above facts lend support to the haemogenous theory of infection in these cases. The lesion is essentially interstitial, and is usually bilateral; there are no evidences of infection lower down in the urinary tract; it is frequently, if not always, associated with infection elsewhere in the body; and finally, in this series, the disease is as common in boys as in girls, and the lesion the same in the two sexes.

We would further draw attention to this last observation. So far as we have been able to discover, conclusive proof is lacking that at this age true pyuria is much more common in girls than it is in boys. Ordinary hospital statistics on this point are valueless. The urine must be obtained under strict precautions to rule out contamination from the vagina or rectum. Pyuria due to urethritis or cystitis will probably cause a slight predominance of this symptom in girls. But when these two sources of pyuria are ruled out, and only the cases of pyuria due to upper urinary tract disease considered, we believe that the incidence will show little, if any, sex difference.

Finally, attention is drawn to certain gross appearances which have led to erroneous diagnoses of inflammation of the urinary tract. It is well known, though often forgotten, that the mucosa of the pelvis, ureters, and bladder is shed very soon after death. In mild degree this gives a turbid appearance to the urine, which has frequently been mistaken for pyuria. In more marked degree it may fill the pelvis or ureters, suggesting local purulent inflammation. Another error is that of considering the deep red discolouration of the urethral mucosa, which occurs post mortem, as evidence of inflammation. Macroscopic diagnosis of inflammation of the urinary tract is dangerous.

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There is an infinite number of more recent clinical descriptions of the disease.

BELL, E. T., AND HARTZELL, T. B., *Arch. Int. Med.*, 1923, xxix, 768, describe a glomerulonephritis which at times causes pyuria in infants.

Drs. O. M. Schliss and J. Wilson, New York Nursery and Child's Hospital, in an independent study have reached conclusions somewhat similar to those set forth above. Their article will appear in the *Am. Jour. Dis. Child.* I wish to express my indebtedness to them for the opportunity of going over their cases and of discussing the problem with them.

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## THE CONTROL OF ARSPHENAMINE TREATMENT BY LIVER FUNCTION TESTS\*

BY H. A. DIXON, M.B. (TOR.), W. R. CAMPBELL, M.A., M.D. (TOR.), AND M. I. HANNA, B.A.

SINCE the introduction of salvarsan and its allies and derivatives, there has been a decided morbidity of varying degrees of severity up to and including death from the poisonous effects of the drug, or rather of its early decomposition products. As to which particular form or brand of the drug is most at fault we are unwilling to make any statement. None, so far as we know, has been entirely free from toxic effect, but it becomes extremely difficult, if not impossible, to distribute the blame for these results between the drug, its prescription for a given patient, its technical administration, the duration of drug treatment, and the reaction of the individual toward these compounds, with probably many other factors as yet unknown. There can be no remaining doubt, however, since the work of Voegtlin and others, that these toxic effects are due to the decomposition of the drug administered and not to the disease, though it must be recognized that a disease so protean in its aspects as syphilis may sometimes, though rarely, present a very similar picture. It must not be thought, however, that decomposition of the drug is something to be avoided. The present evidence seems to indicate that its curative effects are exerted by the toxic decomposition products of the drug rather than the drug itself.

Apart from the cases of acute collapse with vomiting, circulatory failure, and acute exfoliative dermatitis, which are occasionally seen, the most important toxic effect is exerted upon the liver. Since the arsenic is excreted in

large degree in the bile it is perhaps not surprising that the poisonous effects should be manifest in the liver cells. How to avoid this toxic effect being exerted on the liver is a matter of very considerable importance. It has been suggested, in our opinion with a good deal of reason, that abandonment of the older idea of food restriction, and the prescription of a liberal carbohydrate diet previous to treatment is a valuable aid in this direction. Unfortunately this preliminary diet has not banished all the toxic effects. While it is usually stated that the excretion of arsenic is rapid, and cases are known in which the evidences of liver damage are present on the day following the first injection of the arsenical preparation and rapidly progress to liver necrosis, there is, nevertheless, a more chronic form of hepatic injury eventually manifesting itself as liver atrophy several months after all treatment has been discontinued. It is important to note then that a patient is not necessarily safe from the development of a most serious degree of liver atrophy for at least six months following a course of arsphenamine treatment, and the dangers of treatment may well become a matter of considerable legal importance where the state enforces compulsory treatment upon the patient suffering from venereal disease.

It is probable that many of the cases of liver damage of mild degree have escaped diagnosis heretofore because of their mildness and indefinite symptomatology, and that other cases with comparatively slight liver injury have progressed to a stage of advanced liver atrophy before frank symptoms developed. It was with the hope of diagnosing these cases earlier that

\* Read at the Academy of Medicine, Toronto, January 26, 1926.

From the Department of Medicine, the University of Toronto and Toronto General Hospital.

we undertook studies in liver function in the cases receiving arsphenamine treatment.

As is well known, many tests of liver function have been advised from time to time. Most of these suffer from the disadvantage of requiring much time on the part of both patient and physician, and often considerable skill in performing the test and interpreting the results. After some consideration, and preliminary investigation we abandoned the hope of using liver efficiency tests, and adopted the van den Bergh reaction for bilirubinæmia as an evidence for morbidity or lack of morbidity in the patient under treatment. From experience with the method we are confident that many of the milder evidences of liver damage revealed by the method are within the limits of ordinary repair without special treatment. Van den Bergh's test possesses the merit of simplicity and, so far as the patient is concerned, means merely taking a small amount of blood more than is required for the control Wassermann tests. The earlier technique was that of van den Bergh.<sup>1</sup> The technique at present used is that of McNee<sup>2</sup> to whom we are greatly indebted for permission to use it prior to its publication. Normally a concentration of 0.2–0.6 units of bilirubin is present in the blood, while values as high as 80 units are obtained in the most severe cases of jaundice. In a few dark skinned individuals 1.0–2.5 units of bilirubin are present in the blood without other evidence of a pathological condition. When the skin and sclerae are tinted, bilirubin is always to be found in the blood in excess of the normal. Tinting of the surface of the body does not occur, however, until at least four units of bilirubin are present. The subicteroid condition in which 1–4 units of bilirubin is found in the blood has been called latent jaundice.

The van den Bergh test presents no great technical difficulties preventing its widespread use. Owing to its high specificity for bilirubin in the blood it detects liver injury in a comparatively early stage, and the quantitative feature makes it possible to follow the progress of a case under treatment. We have now carried out several hundred observations on between two and three hundred patients. During progress of the investigation a paper by Gerrard<sup>3</sup> appeared, which contains the main points to be discussed here. Gerrard's work, however, was

largely concerned with novarsenobenzol, while most of our cases have received a certain brand of arsphenamine. The amount of liver damage following arsphenamine treatment has been little recognized and the necessity for its control is sufficient justification for the presentation of confirmatory evidence.

It should first be stated that most patients pass through their period of arsphenamine treatment without showing any increase in the serum bilirubin over the normal value, 0.2–0.6 units, so far as we have detected. It is possible, however, that by following cases somewhat more intensively subsequent to an arsphenamine injection, slight increases might occur and later disappear. We have some evidence that this is the case in the variations which sometimes occur in the serum bilirubin both in the normal group, and those whose bilirubinæmia exceeds the normal. Many times a second test following treatment shows a lower serum bilirubin than the test taken before arsphenamine treatment. Since there is a group of normal individuals whose normal bilirubin is distinctly higher than the average normal we have been content to accept values of one unit or less bilirubin as not indicating the necessity for cessation of treatment. Patients with high van den Bergh before treatment have seemed peculiarly susceptible to nausea and vomiting after arsphenamine administration. Cases presenting van den Bergh reactions greater than one, should be watched most carefully throughout the course, and it is even questionable whether any further arsenical treatment should be administered. In our opinion it would be safer to treat such patients with mercury and iodides for some time before venturing to repeat arsphenamine injections. Serum bilirubin concentrations higher than one unit are not necessarily associated with progressive liver damage, however. Indeed, in one instance the test before the first treatment showed 2.3 units; after four treatments 2.0 units; after seven, 1.0 unit; and after ten injections and two months' course of mercury and iodides the value had fallen to 0.6 units, a normal value. This patient was receiving a *neo* preparation. On the other hand, a patient showing a normal value, 0.35 units, after the first treatment, after seven treatments at weekly intervals showed a van den Bergh increased to 1.0 unit, and nine weeks later on

mercury and iodides the van den Bergh was 1.35 units. The patient, at this time, complained of not feeling well with nausea and indefinite gastrointestinal distress.

Although no further increase in severity of symptoms has developed in this case it serves to point out the necessity of special care in cases in which the serum bilirubin is rising, as well as to indicate the delayed damage which may occur from the injections. As many of the cases were not seen by us at the beginning of treatment, data is sometimes rather incomplete. The combination with clinical evidence, however, leads us to believe that in some cases at least, there is a long continued latent jaundice which finally becomes evident as a chronic type of liver damage. A case in point is that of a young man of twenty-six years under intensive treatment with arsphenamine, for a period of eight months complained repeatedly of headache, nausea and vomiting after his injections. Treatment was interrupted for six weeks when a van den Bergh was taken and a further dose of arsenic administered. The van den Bergh report was four units, so the patient was admitted to hospital at once and treatment instituted. Up to the last injection of arsphenamine he had never shown clinical jaundice so far as we know and certainly did not have it when the van den Bergh test was taken. Slight jaundice was noted on admission to hospital. The van den Bergh reaction, however, has never risen above 4.6 units and has now receded to normal. Had the van den Bergh not been taken in this case one might have thought the jaundice the result of the last dose, whereas the latter was more or less incidental and the damage was really done by the previous injections which had ceased six weeks before. Other cases are known in which jaundice has appeared with liver atrophy in six months after cessation of treatment. This emphasizes the necessity of a prolonged follow up of cases which have been receiving arsphenamine injections.

In addition to the subicteroid or "latent" group sixteen cases of cutaneous jaundice (seven with definite liver atrophy, one of whom died) have developed. During the same time but one case of so-called idiopathic acute yellow atrophy has appeared in the wards. A considerable number of other cases showing latent jaundice by the van den Bergh test have been

transferred from arsphenamine treatment to mercury and iodides with good results. Some of our cases of clinical jaundice would have escaped observation, at any rate for a time, were it not for the routine employment of the van den Bergh test. It has been particularly valuable at the night clinics where clinical jaundice is difficult to recognize. It has also assisted in confirming a probable but still indefinite diagnosis and, on the other hand, is useful in clearing up a suspicion of jaundice in dark skinned individuals.

Van den Bergh readings of four units or over in our opinion call for hospital treatment of the patient, and this is arranged for immediately such a reading is obtained by the laboratory. Lower readings call for consultation with the physician and perhaps rearrangement of the plan of treatment. Readings of one unit or less may be neglected as of little importance unless successive readings show a rising bilirubinæmia.

Patients attending the clinic have been divided into five groups according to the duration of their disease, in an endeavour to find out the group most susceptible to liver damage:

Group A: chancre present, darkfield positive, Wassermann negative;

Group B: chancre present, Wassermann positive;

Group C: secondary rash;

Group D: tertiary syphilis;

Group E: congenital cases.

Groups A, B, C and E are all small, as a whole constituting only twelve per cent of the cases. With the exception of one case of congenital syphilis who showed jaundice with well marked liver atrophy after seven treatments of arsphenamine in the clinic, though he had received quite intensive arsphenamine and mercury treatment elsewhere in each of five preceding years, these cases showed little if any morbidity. On account of the small number in these groups, however, it is not thought that statistics in this connection are of any value.

Without entering into the details of treatment we wish to call attention to a case of severe arsphenamine jaundice as an example of the value of the van den Bergh reaction in the treatment of this condition. This woman, suffering from a chronic periostitis, received a

series of nine doses of arsphenamine in July last with considerable benefit. The van den Bergh at this time was 1.25 units. With a return of pain two and a half months later two doses of arsphenamine were taken. After the first no abnormal symptoms occurred, but symptoms followed immediately after the second dose of arsphenamine, and on reporting she was found to have four units of bilirubin in her serum and was immediately admitted to hospital. Subsequent van den Bergh readings over a period of a month were as follows: 4.1, 5.5, 8.1, 19.0, 31., 20., 13.5, 7., 5., 3.7, 2.5, 2.5, and 1.9 units.

The point of particular interest lies in the fact that in this case, as in others we have observed, the van den Bergh reaction accurately foretold the clinical course of the patient's illness, both while she was becoming clinically worse and before clinical improvement became evident. It may also be observed that, until comparatively recently, treatment with diets relatively high in carbohydrate and poor in protein and fat was usually successful in the course of months in bringing about recovery. Dietary change to protein or fat was apt to be followed by a relapse. More recently, however, cure has been much accelerated by the use of sodium thiosulphate intravenously in addition to the carbohydrate diet, and recovery is now a matter of weeks instead of months.

#### Summary

To summarize and conclude we would agree with Gerrard that the van den Bergh test has revealed additional points of interest in the

pathology and treatment of arsphenamine intoxication and represents a distinct advance in its control. Its simplicity is a great point in favour of its more general adoption. Values under one unit may be neglected unless showing a tendency to increase: one to four units requires careful observation and probably alteration in the plan of treatment. Cases showing a bilirubinaemia of four units or more should be placed in hospital and active treatment instituted at once.

Incapacitating illness and, at times, permanent damage to the liver results from the use of arsphenamine in the treatment of syphilis. The van den Bergh reaction can be used to diagnose the early stages of damage while the patient is still in the stage of latent jaundice and while suitable measures can be taken to minimize the damage. It is of value also in the control of the more severe stages of the arsphenamine jaundice and liver atrophy. We are quite convinced of this value and, in view of the fact that treatment for venereal disease is compulsory in Ontario, we contend that arsphenamine treatment without adequate laboratory check on the damage induced by its use, is quite as, or even more unjustifiable than treatment without the Wassermann reaction or other laboratory control on the treatment of the primary disease.

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**Occurrence of Throat Infections With *Streptococcus scarlatinae* Without Rash.**—An investigation was made by Franklin A. Stevens and A. R. Dochez, New York, of an epidemic of hemolytic streptococcus infection as to whether an anginal infection with *Streptococcus scarlatinae* can occur without a rash. If such infection does occur, does it occur in susceptible persons, as indicated by the intracutaneous toxin test for immunity? Do agglutination and toxin production correspond as a test of specificity for the identification of strains of hemolytic streptococcus during an epidemic of scarlet fever? Are

strains of hemolytic streptococci from cases of acute pharyngitis as closely related as the groups from scarlet fever and erysipelas? These questions are answered as follows: Scarlatinal infection of the throat may occur without a rash. This type of infection may occur in individuals showing negative skin reactions to scarlatinal toxin. The Dick test is not a reliable index of immunity to such throat infections with *Streptococcus scarlatinae*. Agglutination reactions with scarlatinal serum and toxin production are closely parallel.—*Jour. Am. Med. Ass.*, April 10, 1926.

## PURPURA WITH INTENSE ABDOMINAL PAIN AS A LATE COMPLICATION OF SCARLET FEVER

BY RICHARD SMITH, M.D. AND T. A. BERTRAM, M.D.

*Dundas, Ont.*

THE patient, a man of thirty-seven, was admitted to the St. Joseph's hospital on November 6th, 1925, for the treatment of an abscess of the left hip. This was opened and drained; a culture from it showed *staphylococcus aureus*. Twelve days later he developed a typical attack of severe scarlet fever, and was sent home. He did well until the fifth day, and then was seized with severe abdominal pains in the epigastrium with vomiting, the vomitus containing some blood. The bowels were constipated; there was no fever; both hands were noted to be oedematous, as also were the feet. The abdomen was flat and was tender on pressure over the transverse colon, but there was no muscle tension. The urine contained a trace of albumen: the bowels had to be moved by enemas, and contained some blood streaks. On November 26th it was noted "that pain continues over the abdomen with nausea, and vomiting of green mucus." The urine was highly coloured and had the appearance of containing blood. On November 27th, the pain was still severe in the abdomen, there was vomiting at intervals of green-grass material. Enemas of glucose, (8 oz. of 5% solution) alternating with plain water, were given repeatedly. The patient also received a hypodermoclysis with novocain. By this date the bowel movement had become a dark brown colour, large purpuric spots appeared on the lower limbs, upper abdomen and elbows; there was still (November 28th) great pain in the abdomen with continual vomiting and much distress; hypodermoclysis was repeated; pain continued and was more severe during the night; the vomited matter consisted of dark green bile and mucus. The urine was now bloody. Morphine sulphate (1-6 grain) relieved the pain immediately for a few hours at a time.

*November 30th.*—The vomiting and pain still continued, with free haematuria, and the passage of blood from the bowels; the pulse became very rapid and weak (130—150). Finally the patient became collapsed and pulseless; a blood transfusion of 275 c.c. was then given, improving his condition almost immediately; the vomiting

stopped, and he became free from pain. The purpuric spots gradually disappeared but the urine contained blood for forty-eight hours after the transfusion. The temperature throughout the attack was normal or sub-normal. Later, the patient desquamated freely over the body, the skin coming off the hands and feet in flakes. The Dick test was negative.

*Discussion.*—The features of unusual interest in this case were the late appearing haemorrhages in the course of a scarlet fever and the intense degree of abdominal pain without local physical signs. Purpura appearing late in the course of scarlatina is naturally to be looked upon as a manifestation different from the early haemorrhagic rash seen at times in most of the "efflorescent" infections such as variola, measles, typhoid, and scarlet fever, and is not often described. Dr. Hannah states that in the enormous admission figures of the Riverdale Hospital, Toronto, he can recall but one or two instances of late purpura in the scarlet fever cases; Kerr of Edinburgh was able to detail two cases from the many thousands entering the Edinburgh Hospital for Infectious Diseases. Reference to the haemorrhagic tendency of scarlet fever is made by McCollum and others, though their descriptions are of smaller skin hemorrhages such as those produced in the early stages of the disease by compression of the arm (Rumpel-Leedes phenomenon), and bleeding from operation wounds. Well marked purpura is evidently not a common incident. The acute abdominal pain with the skin and gastrointestinal haemorrhages is not mentioned as a concomitant of scarlet fever by the various authors consulted. The picture of an unusually severe attack of Henoch's purpura is simulated, and one recognizes a close resemblance to the cases described by Osler as "visceral complications in association with the lesions of the erythema-purpura group of diseases." The association of the purpura and pain with the attack of scarlet fever appears to indicate that to some of these purpuric cases with visceral symptoms the streptococcus haemolyticus and its toxins

stand in distinct relationship; the excess of antibodies found in the developing immunity, rather than the infecting organism may be the cause of the haemorrhages (Christian.) The intensity of abdominal pain in our case resembled that of a perforation of a viscus, and only the absence of local signs and fever prevented us from performing a laparotomy; the beneficial results of transfusion in this particular case were strikingly shown.

In 1808 Willan first reported the occurrence of visceral symptoms in a case of purpura of great severity, with vomiting, severe abdominal pain, diarrhoea, and bloody stools. There were in addition anasarcaous swellings in the thighs and hands, evidently of the nature of angioneurotic oedema.

Later, in 1874, Henoch described the cases more fully, and at present the combination of purpura with abdominal pain is usually labelled "Henoch's purpura." Later still, Osler described a long series of cases of purpura and erythema with visceral lesions of two types: one, mechanical, due to the presence of exudate in the walls of the stomach and intestines, effusion of blood on mucous surfaces, or in the substance of an organ. The other, inflammatory, producing a nephritis, less often an endocarditis, pleurisy, pneumonia, or peritonitis.

The cases have a dual etiology. First, infectious, second, metabolic.

Purpura with or without erythema and exudate lesions may follow almost any infection, septicaemia, endocarditis, gonorrhoea, otitis media, the fevers of parturition, and even local infective lesions of the skin. The rheumatic poison is responsible for a large group. The bacteriological examination of these cases has not been satisfactory. On the other hand there is a large group in which the lesions are an expression of perverted metabolism. Chronic angioneurotic oedema, urticaria and some forms of purpura are possibly anaphylactic phenomena in persons sensitized to certain protein substances. The diverse localization, the variable character of the exudate, now blood, now serum alone, or blood and serum combined, are points that await explanation. The actual exudate is conditioned by the epithelial cells of the capillary wall damaged by circulating poison. The blood platelets are usually reduced in number though the co-

agulating time of the blood is not changed. In true purpura haemorrhagica the *morbus maculosus Werlhofii* of unexplained origin, the blood clot does not contract and there is no expression of serum.

In the symptomatology of purpura stress has been laid on the cerebral, gastro-intestinal and the renal signs. In the *cerebral manifestation* two groups of cases are seen, one with transient attacks of paresis such as occur in Raynaud's disease and in arteriosclerosis; the other a group of cases in which the paralysis is due to a coarse haemorrhage.

The *gastro-intestinal* symptoms of abdominal pain associated with symptoms of purpura to which is given the name of Henoch's purpura are distressing, but they are not the most dangerous. The manifestations may be for years chiefly abdominal, without any skin eruption. Colic is a common symptom. The attacks may be transient, lasting only a few minutes, or they may be of great severity. They may occur independently of any diet. The position of the pain is usually central. The abdomen is generally flat, not painful on pressure, and without increase of muscle tension. There may be marked tenderness along the transverse colon. Vomiting is probably as frequent as the colic. Diarrhoea is not so common as the vomiting. The *renal complications* are the most serious. They fall into three groups. (1) Those cases which run an acute course with dropsy, and death in uremia within three months. (2) Those cases in which the albumin disappears allowing the patients to make a complete recovery. This may take several months. (3) Those cases, a small number, in which the nephritis becomes chronic. For a ready clinical appreciation of the purpuras, one should refer to the many papers on the subject contributed by Sir William Osler; the distinguishing of purpura haemorrhagica proper, the *morbus maculosus Werlhofii*, from the secondary or symptomatic purpuras, from the arthritic purpura (simplex and Schonlein's), from Henoch's purpura, and from the purpuras with visceral symptoms must always require much discerning consideration; the absence of associated conditions such as arthritis or pain is a suggestive feature; the remarkable deficiency in the platelets and the lack of any hereditary factor will distinguish purpura haemorrhagica from haemophilia.

## THE TREATMENT OF INCOMPLETE ABORTION\*

By E. PERCIVAL, M.D.

*Montreal*

THE ideal form of treatment of incomplete abortion is the one which assures that all placental tissue has been removed from the uterus with the least trauma possible. At the present time, three forms of treatment seemed to be favoured, namely:

1. The so-called conservative treatment, in which pituitrin in one-half c.c. doses is used combined, if bleeding is excessive, with tight packing of the vagina.
2. Instrumental dilatation of the cervix and digital exploration of the uterus.
3. Instrumental dilatation followed by instrumental curettage.

Different clinics have modified these methods slightly. Believing that when instrumental dilatation was used, the morbidity was unduly high, and the number of days spent in hospital too great, and that there was too much uncertainty in the conservative method as to whether the uterus was empty—the form of treatment now in use at the Montreal General Hospital was introduced by Dr. Little one year ago. It is really a modification of the second method described above.

If the cervix is dilated by means of Hegar's dilators to admit the index finger, considerable damage is inevitably done. As the lymphatics of the uterus run from the cervix toward the broad ligaments, any damage to the cervix favours the spread of an infection to the parametria. A physiological dilatation is more nearly approached by packing the uterus and cervix tightly with gauze, thus stimulating uterine contractions. Again, if we depend on pituitrin and vaginal packing, in a goodly number of cases all the placenta will be removed with the pack, but a considerable number of patients will return in a few days or weeks after discharge complaining either of pain from spreading infection or haemorrhage due to a retained fragment.

The details of our treatment are as follows: If the cervix is open, easily admitting a finger, and there is free bleeding, the uterus is emptied under gas oxygen anaesthesia, by means of the gloved finger. The right hand is introduced into the vagina and the index finger used to explore the uterus and separate the piece of placenta. The left hand placed on the abdomen, grasps and steadies the uterus from above. When all the fragments are loosened from their attachment, the hand is withdrawn and if necessary the pieces removed with an ovum forceps. Undue manipulation is avoided. On the other hand, if the cervix does not admit a finger a 1" or 2" gauze pack soaked in aeriflavine emulsion is pushed through the cervix into the uterus with an appendiceal packer without anaesthetic. The fundus, cervix and vagina are all tightly packed. Twenty-four hours later, this packing is removed under



anaesthesia, and as the cervix is now open, the uterus is explored with the gloved finger. Sometimes on removing the pack pieces of placenta are seen adherent to it. However, as we are unable to say whether the uterus is free of all products of conception, time is saved by exploration digitally. No douche either vaginal or intrauterine is given at any time. Forty-eight hours after returning from the operating-

\* Read before the Montreal Medico-Chirurgical Society, March 5, 1926.

room, the patient is allowed out of bed and is discharged the following day.

Contrasting the last twenty-five cases treated in the above manner, with the last twenty-five treated by instrumental dilatation and curettage—the former required 5.2 days hospitalization and showed an average maximum temperature rise to  $99.2^{\circ}$  while the latter group were 9.2 days in the hospital and showed an average morbidity of  $100.6^{\circ}$ . The latest report from the Women's Hospital, New York, where 80 per cent of incomplete abortions are treated by instrumental dilatation and curettage and 20 per cent by the

conservative method—showed 11.6 days hospitalization for those treated radically, as against 11.8 for the conservative method (pituitrin). Dr. Gordon of Bellevue Hospital, N.Y., who advocates the conservative treatment, reports that the average stay in the hospital among 768 aseptic cases, was six days. Whilst we cannot hope to get any better results than these, still we do not feel that we can discharge the patient with absolute confidence that the abortion is complete, without any exploration whatever of the uterus.

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**The Virus of Foot-and-Mouth Disease.**—It is doubtful whether any ailment, not even excepting cancer and tuberculosis, has been more frequently mentioned in the public press during the last few years than foot-and-mouth disease. An illuminating account of the most recent work on the subject appears in the December number of the *Journal of Comparative Pathology and Therapeutics*, where Dr. J. H. Arkwright, Dr. M. Burbury, Dr. S. P. Bedson, and Dr. H. B. Maitland record the results of work carried out by them at the Lister Institute. The report is divided into two sections. The first section deals with the transmission of foot-and-mouth disease to rodents. The authors have confirmed the observations of continental workers that this disease can be easily and regularly transmitted to guinea-pigs, and have studied the main features of the disease in these animals in some detail. Transmission is usually effected by intracutaneous inoculation of the sole of the hind foot with diluted vesicle fluid, but intramuscular, subcutaneous, intraeardiac, and intraperitoneal inoculations are also successful. The virus is also contained in the epithelium covering the vesicles—indeed, this was the source of the viruses used in these investigations; and the blood of animals in the early stages of the disease, as well as the oral secretions, are also infective. In guinea-pigs manifestations of the disease and the resulting immunity appear to be sufficiently clear-cut to make these animals reliable indicators of the presence or absence of an active virus, a matter of the first importance in the study of filterable viruses. Certain results which have been obtained in these investigations are rather

startling in view of the extreme infectivity of the disease as it occurs among stock. No instance of spontaneous transmission from an infected to a susceptible guinea-pig was observed, though every opportunity was given for such a spread to take place. And though the blood of infected guinea-pigs contains the virus at certain periods of the disease, transmission by bugs from one animal to another has not been achieved. The second section of the paper contains a detailed account of the investigation made on the virus itself; all attempts at its cultivation have so far failed, and the authors find in their work confirmation of the unfavourable report of the recent German commission on the claims of Frosch and Dahmen to have succeeded in this matter. Many interesting observations have been made, however, on the survival of the virus *in vitro* under various conditions. It is found that survival is best at low temperatures, but in certain media it remains active at  $37^{\circ}\text{C}$ . for several days, and it is reasonably suggested that a careful study of these media may successfully pave the way to cultivation. The reaction of the medium appears to be of the highest importance, the optimum pH being 7.5—7.6, but, on the other hand, the virus seems to have a considerable degree of resistance to such agents as phenol, alcohol, and chloroform. The observations here briefly referred to appear to be of great interest and importance; the investigation is being carried out in a manner which augurs well for success, and it is not unreasonable to hope that a reproach to scientific medicine, by no means in this country alone, may soon cease to be justified.—*Lancet*, Feb. 6, 1926.

## Case Reports

### SUDDEN DEATH IN CASE OF STATUS LYMPHATICUS

#### HISTORY WITH PATHOLOGICAL REPORT

BY JAMES MILLER, M.D.

*Director Pathological Laboratory, Queen's University, Kingston*

**History of case.**—A young man while playing a strenuous game of tennis in a tournament at college stooped to pick up a ball. He stumbled, straightened himself, staggered a pace or two then slowly collapsing to his hands and knees fell on his abdomen his head to one side. The men playing in the next court (medical students) were quickly beside him but they found that the pulse had stopped or was too feeble to be felt. There was a slight breath with stridulous inspiration and then he lay still. Artificial respiration was tried without result.

**Previous History.**—He was nineteen years of age, tall, (6ft. 1 in.) well built, wiry and fairly muscular but had always been pale, and was considered weakly and was of a nervous disposition. There was a history of his having had an anaesthetic at the age of twelve years for some slight operation. During the summer of 1924 he had worked for a few months as timekeeper with a railroad section gang. During the following winter he went through what was described as a severe attack of pneumonia. At this time he was in bed for six weeks, and he made a slow recovery. During the following summer he was unable to resume work as he had planned, but he indulged in some fairly strenuous tennis and in swimming. In the fall he entered college, and shortly thereafter he spent a week in bed suffering from chest symptoms. About two weeks before the date of his death he had a fainting attack brought on by no apparent cause. When in this attack he was noticed to have great difficulty in breathing. He came round rapidly, and remained well until the time of his death with the exception of some symptoms of a cold in the head and chest present at the time of the fatality.

There was a history of tuberculous disease in the mother. One sister is described as delicate.

The afternoon on which the event occurred was bitterly cold. A little more than one set of tennis had been played when his death occurred so tragically.

The *post mortem examination* was performed within four hours of death. The body was that of a well developed and well nourished young man without rigor mortis, and with marked cyanosis of lips, ears and face.

The appearances in the internal organs may be summarized as follows: There was scarring at the apices of both lungs. Both organs were pale and emphysematous. The heart showed a dilatation of the right side, particularly of the right atrium. There was a general congestion of the abdominal organs, particularly of the mucous membrane of the bowel and of the kidneys. The spleen was large, measuring 5 by 4 inches. It was firm and congested and the Malpighian bodies were prominent. The lymph glands of the body generally were enlarged. This was particularly marked in the case of the bronchial, mediastinal, retro-peritoneal and mesenteric glands. No caseation was to be seen in any of the glands. The lymphoid tissue of the small intestine—Peyer's patches and solitary follicles—was swollen. The appendix was thickened and elongated. The suprarenal glands appeared to be small. The thyroid gland was distinctly enlarged showing a fairly well marked condition of colloid goitre.

The thymus gland freed from all surrounding tissue measured 6 x 5 1/4 x 1 c.m. It weighed 14 grammes. In addition to the gland itself there was a small mass of the thymus tissue below the gland, in front of the trachea. There was no apparent pressure of the gland upon the trachea.

The brain was large and oedematous and the ventricles contained more fluid than normal.

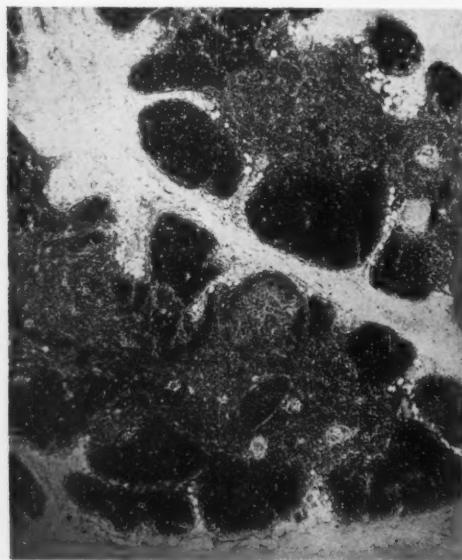
Summarizing the gross appearances, there was evidence of quiescent tuberculosis in the lung apices. There was a general hyperplasia of the lymphoid tissue of the body, the thyroid gland showed a mild condition of colloid goitre and the thymus was large but not strikingly enlarged. A diagnosis of death from status lymphaticus was given.

Microscopic examination of the tissues did not

add much to the information gained. The lymph glands and spleen showed evidence of marked hyperplasia. The germ centres of the lymph nodes were enlarged and there were numerous minute haemorrhages into the substance of these organs but there were no necrotic areas.

The thymus gland was well developed but showed no striking alteration beyond numerous small haemorrhages.

The lungs were emphysematous and the bronchi contracted.

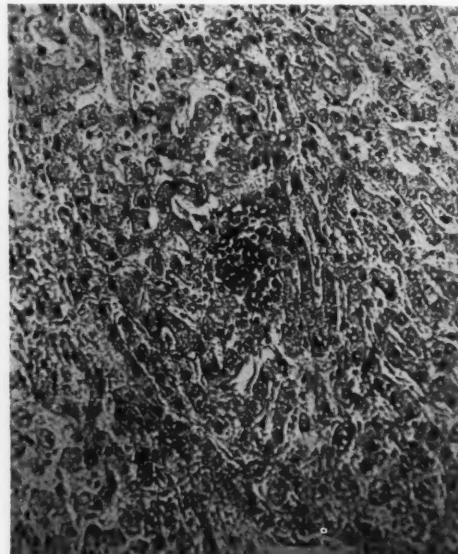


Low power view of thymus gland. The cortex is dark and the medulla pale. The round clear areas are Hassall corpuscles. Pale patches in the cortex indicate haemorrhages.

The liver showed collections of lymphocytes within the lobules as well as in the portal tract. In the vessels of the organ a marked preponderance of lymphocytes over polymorphs was noted.

**Discussion.**—As is well known the thymus gland increases in size up to the period of sexual maturity. It then undergoes a progressive atrophy. In a certain number of cases the gland is unusually large, frequently weighing over 25 grammes. In other cases instead of atrophying it simply remains large and active into adult life. This enlargement or on the other hand failure to undergo involution is usually associated with general increase of the lymphoid tissue of the body. There is also in some cases a hypoplasia of the cardio-vascular system and

imperfect development of the sex glands. The subjects of this condition are often well developed and well nourished but are usually pasty in appearance. They often succumb to infections of a comparatively slight degree of severity and not infrequently they die suddenly without obvious cause. The fatal issue usually occurs in childhood but it is occasionally delayed until adult life. To this collection of symptoms the term *status lymphaticus* has been applied. When accompanied by thymic enlargement the name *status thymo-lymphaticus* has been used. The condition is said to be about six times more common in males than in females.



Small lymphoid aggregation within a liver lobule

Symmers who has made a special study of the condition in the Bellevue Hospital, New York, states that there are two types of sudden death in *status lymphaticus*. (1) Sudden death referable to intoxication in which there are immense numbers of necrotic areas in the germinal follicles of the lymph glands. According to Symmers, death in these cases is of the nature of an anaphylactic reaction, sensitization being due to the release of nucleo-protein from the lymph glands. (2) Sudden death following haemorrhage into the brain due to the imperfect development of the cerebral vessels.

In the case under consideration there was certainly no cerebral lesion. Nor were there necrotic foci in the lymph nodes. There were how-

ever immense numbers of minute haemorrhages into the lymph glands which may have acted in a similar fashion to the necrotic foci, by permitting the sudden absorption of products of the lymphoid tissue. On the other hand those haemorrhages may have been due to the rise of blood pressure within the venous system at the moment of the fatal issue. It is significant however that the haemorrhages were confined to the lymphoid tissue and thymus gland. It might be claimed that this case fails to fulfil all the requirements inasmuch as the thymus gland, although active, was not enlarged. In reply to this it may be stated the measurements of the gland in our case correspond very closely to those given in a case cited by Rice (see *Barker's Endocrinology and Metabolism*, ii, p. 405), where sudden death occurred in an army officer after typhoid vaccination. The thymus itself does not require to be greatly enlarged in order to justify a diagnosis of *status lymphaticus*.

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#### RHINO-PLASTY WITH IVORY TRANSPLANT\*

By A. E. LUNDON, M.D.

*Montreal*

The case, first seen by me in the Ear, Nose and Throat Department of the Montreal General Hospital, is that of a young lady who, at the age of four, sustained an injury producing marked external deformity of the nose and a deviated and dislocated quadrangular cartilage resulting in complete occlusion of the left side of the nose and almost complete occlusion of the right side.

Figure 1 shows the nature of the external deformity. The tip, columella, left ala and lower half of the dorsum of the nose are deflected to the left, and the dorsum of the nose, between the tip and the bony framework, is flattened.

As is often found in such cases, a bony hump was present on the convex side—in this case the right side—due to an apposition of bone in the region of the suture between the nasal bone and the nasal process of the maxillary bone.

The correction of the deformity which extended over a period of eight months, was completed in October last, and involved operative interference in four stages; the first was a complete resection

\* Presented before the meeting of the Montreal Medico-Chirurgical Society, March 5, 1926.



FIG. 1.



FIG. 2.

of the quadrangular cartilage under local anaesthesia by means of an ordinary submucous resection operation.

Failure in completely attaining the objective in the second operation was due to the fact that the removal of the bony apposition was attempted

under local anaesthesia. The infiltrated novocain distorted the picture in such a way as to render it difficult to decide when sufficient bone had been removed, with the result that it was necessary to administer a general anaesthetic and perform a third operation for the complete removal of the bony prominence. At the time of this second operation, a portion of cartilage was removed from the left ala.

The fourth operation was performed for the purpose of correcting the dorsal depression which had been aggravated slightly, as was anticipated, by the complete removal of the quadrangular cartilage at the first operation.



FIG. 3.

The correction of the dorsal depression was carried out by means of the implantation of an inorganic transplant. For this purpose, ivory was chosen. This substance produces very satisfactory results in such cases. It is easily obtained and shaped to suit individual cases, is of a structure similar to bone, and can be easily extracted if infection occurs. It overcomes the objection of patients to having bone removed from other parts of their anatomy; whereas bone shows a tendency to absorb, cartilage often produces irregularity of the dorsum of the nose; both are comparatively difficult to obtain and are more readily infected than ivory. The latter substance, if introduced with proper technique,

produces no reaction, immediate or remote, is preferably used with multiple perforations and is soon surrounded with a tough, fibrous capsule which prevents its displacement.

In this case, the ivory transplant was introduced endonasally, as is preferable in the absence of any infection of the nasal fossae or sinuses or scarring of the nasal mucous membrane, the result of previous operations or prolonged suppurations. Its introduction must necessarily be followed by suitable tamponage and splinting for a period of one week.

Figure 2 is a profile view of the case following the third operation and demonstrates the irregularity of the nasal dorsum above referred to. The tip, columella and dorsum had, at this time, assumed their normal alignment, the left ala had contracted to proper dimensions, the bony apposition was no longer in evidence and no obstruction to breathing existed.



FIG. 4.

Figure 3 and 4 shows a front and profile view of the patient four months after the completion of the last operation. The nose is shown to be in proper alignment, the dorsum no longer being depressed; and Fig. 4 when contrasted with Fig. 1—the latter taken just prior to any operative interference—indicates in a striking way the marked relief which the correction must have afforded the patient from her former humiliation and psychic depression.

**SYPHILITIC PERIOSTITIS OF THE CERVICAL VERTEBRAE AND RIGHT CLAVICLE**

By L. C. MONTGOMERY, M.D.

*Montreal*

The patient, a male, clerk, aged sixty-one years, was admitted to hospital, January 7th, 1926, complaining of swelling in the left side of the neck with pain which radiated up behind the left ear and down over the left shoulder and which was worse at night.

The family and personal history were negative excepting the loss of five pounds in weight during the past six months. No history of venereal disease was obtainable.

*Present illness.*—He was in apparently good health until September 1925. Then he began to notice a fullness in the left side of the neck extending up behind the ear. This fullness was associated with radiating pain up behind the left ear and down over the left clavicle. The pain was always confined to the left side of neck and was worse at night. It was of a dull aching character aggravated by moving the head about.

*Present condition.*—On admission, examination revealed a moderately well nourished male, in appearance about the stated age. Pulse and temperature were normal. The head was carried slightly to the right. The pupils were equal and active. An artificial denture occupied the upper jaw; the lower teeth were in poor condition. Pyorrhœa was present. The tonsils were submerged and reddened but no pus was expressed by pressure.

In the left posterior cervical region was a flat' slightly raised area about 9 cm. in diameter. It extended downwards and backwards from the tip of the mastoid process. It was not nodular, tender, nor could the margins be well defined. It felt of a rubbery consistency. There were no definite glands palpable in either right or left cervical regions. There was no limitation of movement of head or neck.

Over the inner third of the right clavicle was an oval swelling the size of a peach stone. (This had not been noticed by the patient.) It was smooth, firm, and seemed to form a definite part of the clavicle. There was no general glandular enlargement. The remainder of the physical examination was essentially negative. The knee jerks were active and equal. In view of the patient's age and the appearance of the swelling in the neck, malignancy was at first suspected.

The laboratory findings showed a normal blood count and normal urine. The blood Wassermann was triple plus on two occasions.

X-ray examination of the right clavicle and cervical vertebrae showed no definite bone involvement, but a definite thickening and roughening of the periosteum of the left transverse processes of the third and fourth vertebrae, and also of the inner third of right clavicle. Plates of the chest and of the bones of the pelvis were negative.

In view of these findings the patient was given anti-luetic treatment, potassium iodide, mercury and diarsenol. Relief of the pain in the neck was obtained after the first few doses of potassium iodide. The swelling in the neck and clavicle gradually lessened, and when last seen on March 6th, 1926, both appeared to be normal in contour.

The writer is indebted to Dr. A. H. Gordon for permission to publish this case report.

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**LATE DECOMPRESSION OF LUMBAR CORD FOLLOWING INJURY\***By WILLIAM O. STEVENSON, M.B., F.R.C.S.  
(Edin.)*Hamilton*

This case is thought worthy of reporting for two reasons. It illustrates how easily a fractured vertebra may be overlooked and treated as a sprained back; and it illustrates that frequently relief, if not complete cure, can be afforded by a laminectomy.

*History.*—The patient was a male, aged fifty-four years; a baker; married; with a healthy family; never previously ill.

Five years ago the patient fell from a ladder breaking his fibula and receiving some injuries to his back. He was told that he was able to go to work six weeks later. However, it was over three months before he was able to do so and then only in a light capacity. He stated that he has never felt well since the time of this injury. He always rested when not at work. Three years later he began to have more pain in the lumbar region with weakness in the lower limbs and had to use a cane to steady himself. One year later a condition of uncertainty in the control of his sphincters began, and the muscular weakness in

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\* Presented before the Hamilton Medical Society, January 20, 1926.

his lower limbs increased so that he was unable to walk steadily without the use of his cane. As a consequence he had to discontinue his work. The patient presented himself for examination five years after his injury.

*Physical examination.*—The cardiovascular, digestive and respiratory systems were healthy and presented no symptoms of importance.

*The brain.*—The patient was normal mentally and did not suffer from headaches, or vomiting, nor show any indications of optic atrophy or diminution of the visual field to peripheral blue, which symptom is said to precede the classical symptoms in a case of brain tumour. Examination showed no ocular disturbances; no nystagmas nor skew deviation. Asthenia, ataxia and atonia, were shown in the lower limbs only.

*The cranial nerves* were all apparently normal. *The dorsal nerves* supplying the upper limb and the trunk were normal with no trophic, sensory, or motor disturbances. *The lumbar and sacral nerves* showed indications of some interference. The lower limbs on examination presented a few areas of disturbed sensation to touch and heat and cold. There was no wasting. Muscular tone was poor and the man walked unsteadily. The gait was of no special type but appeared to be due to unbalanced control in the different muscular groups of the legs. He resembled a drunken man with his reeling gait. *The reflexes* were normal, save for some depression of the knee-jerks, one more so than the other; Kernig's, Romberg's and Babinski's signs were absent. An examination of the rectal sphincter showed that it was very atonic.

The *x-ray* revealed a wedge-shaped first lum-

bar vertebra with an absence of the inter-vertebral disc between it and the second lumbar vertebra. The line of the old fracture was definitely seen. There was no caries as in tuberculosis. There was no evidence of lipping or any new bone formation as in spondylitis. There was no rarefaction as in Kummell's disease. There was no destruction of bone as in a new growth. The Wassermann reaction was negative both in blood and spinal fluid. The diagnosis of disseminated sclerosis was not considered, owing to the absence of eye symptoms. The duration of this case, five years, with an initial injury and with symptoms confined below the level of the first lumbar vertebra, taken into consideration with the x-ray findings, justified the diagnosis of pressure on the lumbar enlargement of the spinal cord.

*Operation.*—A laminectomy was performed removing the laminae of the twelfth dorsal and the first and second lumbar vertebrae. There was no extra-dural fat. The dura perceptibly bulged when pressure was removed and its appearance indicated some congestion. The nerves were traced to the inter-vertebral foramina, dura was not opened. The wound was then closed.

*Result.*—It is six months since the operation. The patient has regained complete sphincteric control. The sensory disturbances in his limbs have disappeared. The knee-jerks are stronger and equal. The muscular power of his legs has increased and he is now walking quite steadily and without a cane. He is feeling much better generally. The local pain has ceased and he is thinking of going to work.

**Prophylaxis in Tuberculosis.**—B. Weill-Hallé and R. Turpin (*Bull. et Mém. Soc. Méd. des Hôp. de Paris*, December 24th, 1925, p. 1589) describe an attempt to obtain immunity from tuberculosis in the case of infants. They used the special vaccine of Calmette known as "B.C.G." which is a living culture. It was given by mouth on the fourth, sixth, and eighth days after birth. Bacilli were passed in the excreta for a few days, but no ill effects were observed. The authors have treated a series of 254 patients, some with a healthy and others with a tuberculous parentage. The mortality in the whole series was 13; 5 children died within the first month of gastro-enteritis, but in the institution where the tests were made 5 deaths occurred from the same cause among non-vaccinated infants. There were 8 deaths between the ages of 1 month and 1 year, but

in no case was the death traceable to the vaccination. Certain infants born of healthy parents, and who became exposed to infection for the first time at the age of a few months, lost no weight and showed no clinical evidence of the disease, but the von Perquet reaction became positive and pulmonary nodules were seen on x-ray examination. The question now confronting the authors is that of revaccination, since the immunity lasts only about two years. The original method is no longer suitable, since the child's intestine differs from that of the infant at or shortly after birth. The difficulty lies in the fact that to establish the success of a subcutaneous injection the child's von Pirquet reaction must have been negative for at least one month beforehand.—*Brit. Med. Jour.*, Feb. 13, 1926.

## Retrospect

### ON SPLENECTOMY

By F. G. FINLEY, M.D.

Montreal

#### The Mortality and End Results of Splenectomy.

William J. Mayo, M.D., *Am. Jour. of Med. Soc.*, Mar., 1926

Splenic Anæmia of Young Children treated by Splenectomy. Ashby and Southam. *Brit. Med. Jour.*, Mar., 6, 1926.

In the first of these articles Mayo discusses the results, immediate and remote, in 417 cases of splenectomy. The spleen has three known functions. It filters microorganisms and toxins from the blood stream, either destroying them or passing them on to be dealt with by the liver; a second function is the formation of white blood corpuscles and a third is the destruction of deteriorated blood corpuscles, resulting in the formation of bile pigment. Undue destruction of red cells is produced by excessive splenic activity due to an increased size of the spleen from whatever cause.

The earlier statistics of splenectomy gave a mortality of from twenty-five to thirty-five per cent. Improved technique and earlier operation have greatly reduced the death rate and in the 417 cases recorded the mortality was only 10 per cent in hospital, irrespective of the period spent there.

In 190 cases the operation was performed for conditions resulting from infections or toxins, the mortality being over ten per cent. Ten of these were of syphilitic origin with profound anæmia which had failed to respond to prolonged treatment, and yet improved rapidly after splenectomy. In most of them spirochetes and syphilomas were found, and occasionally liver gummata as well. In eight cases there was tuberculosis of the spleen, without evidence of the disease elsewhere, with one death from miliary tuberculosis. In septic cases, as endocarditis and osteomyelitis results were unfavourable; seven deaths in twenty-four cases, whilst all instances of septic endocarditis were fatal in hospital or a few months later.

Death resulted in thirteen out of 114 cases of splenic anæmia. Adhesions especially under the diaphragm required enucleation rather than removal and under such circumstances the

operation should possibly be abandoned. With a terminal cirrhosis complicated by anæmia, hemorrhages, ascites and œdema of the extremities, successes were obtained and some survived for many years, but obviously the operative risk is greatly increased in such instances. The majority of the deaths after operation were caused by progressive portal thrombosis from the splenic pedicle extending to the portal system or the superior mesenteric veins. Ten per cent of the patients died from secondary haemorrhage mostly from the stomach, within ten years.

The success obtained in the Banti cases was not attained in the splenic enlargement of portal cirrhosis, there being nineteen cases and six deaths. Possibly a careful selection of cases, choosing those in which the spleen enlarged early, might be attended by better results.

In the group of cases termed biliary cirrhosis there is obstructive jaundice with great enlargement of liver and spleen, but without evidence of infection of the gall bladder or common duct, sometimes followed by the more familiar type of biliary cirrhosis. Some of these may have been instances of Hanot's cirrhosis and others of atypical haemolytic jaundice. The mortality was one in fifteen cases, and although the jaundice lessened, it did not entirely clear up. Anæmia, however, disappeared and most of the patients were able to return to work.

In leukæmia after reduction in the size of the spleen by radium and x-rays unusually good immediate results were obtained. Instead of the fatal issue so often recorded in the earlier attempts, there were only two deaths in fifty cases. The white cells decreased and in some instances the patients continued at work for more than five years. A fatal course, however, after temporary improvement, is the rule.

In haemolytic jaundice and hemorrhagic purpura excellent results were obtained. In the former there were sixty-nine cases with four deaths, and although fragility of the red cells continued, the sixty-five patients were cured and remained well. Gall stones were present in sixty-eight per cent of these cases, even in young individuals. In the purpuras the blood platelets rapidly increased and the patients were immediately relieved and remained well. There were no deaths in eleven cases.

Of pernicious anaemia there were sixty-two cases and four deaths, with no fatalities amongst the last forty operated upon. Giffin's study of the post operative history of these cases showed that the duration of life was two and a half times longer than in the unoperated.

Emphasis is laid on the importance of operating when the patient is on the upgrade in all forms of splenic enlargement. The author believes that with a proper selection of cases the operative mortality should not exceed five per cent.

Ashby and Southam record three cases of

splenectomy in young children after radium and x-rays had been tried unsuccessfully, all of whom recovered and were greatly benefitted, and in whom rapid improvement of the blood took place following operation. They conclude that the operative risk is slight after preparation with transfusions and a preliminary massive dose of x-rays to reduce the size of the spleen, so rendering the operation less formidable. In a series of twelve cases treated by one of the authors by medical means seven died; a mortality of fifty-eight per cent.

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**Anti-Tuberculosis Vaccination of Cattle.—**(*Federal Department of Agriculture*).—The attempts that are now being made in several countries in Europe to test the practical application and value of bovo-vaccination according to the method of Professors Calmette and Guérin of the Pasteur Institutes, Paris and Lille, France, will be followed with world-wide interest and close scrutiny. In Canada, vaccinal immunization of cattle against tuberculosis has been the subject of experimental research by the Federal Department of Agriculture for a number of years, and different methods, including that of Calmette and Guérin are under intensive study at the present time. In order to discuss the question with European authorities and to ascertain the nature and extent of the trial experiments commencing in France, Belgium, Holland and England, a visit to a number of institutes in the countries mentioned was made during the months of August and September, 1925.

The vaccine originated by Professors Calmette and Guérin, now known as "B.C.G." consists of a suspension of living tubercle bacilli, originally from a bovine source and of high virulence. By a special process of laboratory cultivation and attenuation, extending over many years, this particular strain of tubercle bacilli is said to have entirely lost its virulence and to be absolutely harmless for all species of animals, although retaining certain properties capable of creating a reaction and an immunity to tuberculosis in the animal vaccinated with it.

To acquire this immunity the animals must be vaccinated as calves, within 15 days of birth, and re-vaccinated annually. After the first

vaccination the calves are permitted to mingle with other cattle in the heard in the usual manner and no steps are taken to prevent exposure to infection. In France, the majority of the herds are tuberculous. About 500 calves in over 50 herds have already been once vaccinated and it is intended to extend the treatment to 500 herds and to continue it over a 5-year period.

In England it is not proposed to vaccinate any herds licensed to supply "Certified Milk" or "Grade A (tuberculin tested) Milk" but to more or less limit the experiment to about 50 herds maintained for breeding purposes. In Belgium and in Holland the experiments are to be made on fewer herds but under the close and continuous supervision of the State or Government authorities.

The claim made by Calmette and Guérin that their "B.C.G." vaccine is harmless for all species of animals is of the utmost importance. If it should come to pass that this strain of tubercle bacilli is restored to virulence after passing from the vaccinated animal through other animals by natural means, as it conceivably may do, the results might well be disastrous; if, on the other hand, its harmlessness remains fixed and constant while there is no lessening of its power to stimulate a specific reaction and a resulting immunity in the inoculated subject then it may prove to be a successful means of greatly reducing tuberculous disease, especially applicable in countries in which the infection is far too widespread and extensive to permit of the methods aiming at complete eradication as at present practised in Canada and the United States and with a considerable degree of success.—E.A.W.



H.R.H. THE PRINCE OF WALES

We are proud to announce that His Royal Highness the Prince of Wales has graciously consented to become Patron of the Canadian Medical Association, and sends his best wishes for the continued success of this body.

The Prince thus allies himself with the organized medical profession of Canada in the firm belief that the health and welfare of the people of this Dominion are ensured through the progressive activities of scientific medicine. His Majesty King George, bestows a similar honour upon the British Medical Association.

## Editorial

### IMMUNIZATION AGAINST TUBERCULOUS INFECTION

IN a recent issue we called attention to a vaccine prepared by Professors Calmette and Guerin from a bovine tubercle bacillus. A virulent strain of this bacillus was passed through a long series of cultivations on a potato medium, treated with glycerine and ox bile until a very attenuated strain was obtained, and the bacillus became so modified that it proved non-tuberculogenic, but remained capable of provoking abundant antibodies and agglutinins. Animals treated with this vaccine were unaffected by intravenous injections of virulent bacilli. Since the first publication of their paper in 1920, investigation has been continued, and a paper describing the extension of this method to infants has now been published (*Annales de L'Institut Pasteur*, February, 1926, p. 69).

After 230 successive subcultures during thirteen years of growth on a glycerinated bile potato medium it was found that the organism was rendered so attenuated that it could be injected in a living state in large doses into mammals without giving rise to disease, and it conferred upon them the power of resisting the intravenous injection of 5 mg. of living virulent bovine bacilli, which proved fatal to nonvaccinated animals in two months. Not only did this vaccine prove effective against experimental, but also against tuberculous infection conveyed in the usual way in monkeys who are among the most susceptible animals to infection. Having experimented thus far, Professor Calmette consented to try the method on infants selecting those who were being brought up by tuberculous parents or attendants. The vaccine was administered by the mouth during the first ten days of life when the bacilli would be readily absorbed by the upper part of the small intestine. The first infant on whom it was tried was one

obliged to live with a tuberculous grandmother. Three doses were given at intervals of a few days in July 1921. No ill effects were noted and the child today remains in perfect health. Since this time numerous infants have been similarly vaccinated. The vaccine is given by the mouth in three doses of 10 mg. each during the first ten days of life. It can be mixed in a spoon and given with a little milk. No discomfort has attended or followed its administration. Five hundred and eighty-six infants during the first few days of life have been thus immunized in France since July 1st, 1924. All of these have been infants in more or less close contact with one or more persons suffering from tuberculosis. On January 1st, 1926, ninety-six of these children had died from various non-tuberculous causes, and eleven from what was deemed to be tuberculosis. This figure is in sharp contrast with similar non-immunized children brought up similarly in contact with tuberculous persons, of whom more than twenty-five per cent die within the first year of life.

The evidence is that the immunity obtained by this vaccine endures as long as the bacilli in the vaccine survive (probably about a year) after which it may be necessary to repeat the administration in the same way as it was given at first. In animals this repeated treatment has not been followed by any adverse effects. It seems probable therefore that children would incur no risk and would be benefitted by an annual repetition of this vaccination treatment.

It is yet too early to form a tentative opinion of the value of this measure, yet it would appear probable that in the future ninety-three per cent of the children of tuberculous parents, even if brought up in a tuberculous environment can be protected. This immunization appears

to be so simple, harmless, and easily administered that during the next few years there should be no difficulty in carrying out its employment in a sufficient number of infants, so that a positive opinion of the value of the procedure may be obtained. It is to be noted that this serum

should not be given to persons already exposed to infection, hence the necessity of employing it within the first few days of life. We publish in this issue a filler stating that the Government of Canada are already making use of this vaccine for cattle.

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### ON VENTILATION

FOR the period of one hundred and fifty years, scientific men have devoted their time and efforts to the elucidation of the problems of ventilation. Briefly, the development of the science has gone through three stages:

The first stage began in the later eighteenth century with Lavoisier, who, following discoveries in the chemical constitution of the air, propounded the carbon dioxide theory; all the evils of defective ventilation were ascribed to excessive concentrations of that gas.

The second started in the sixties of the last century when von Pettenkofer brought out his toxin theory, in which the deleterious influences of bad ventilation were charged to hypothetical toxic substances exhaled by the skins and lungs of the room's inmates. The carbon dioxide content of the air was considered to be of no importance of itself; it was regarded merely as an index of the degree of atmospheric contamination by alleged toxic agents. Thus it came about that both schools measured the quality of ventilation by the maintenance at a minimum of the carbon dioxide content. Even yet it occurs that specifications for systems of ventilation are drawn with the sole aim of keeping the carbon dioxide content low.

The third and last stage began in 1883 with Herman's claim that defective ventilation (in the absence of contaminations with foreign gases and dusts) was harmful only through improper cooling of the body and indirectly from unpleasant odours. Since then many observers have proved the essential accuracy of his opinions. Within recent years Leonard Hill's<sup>1</sup> katathermometer, a simple instrument which measures directly the

"cooling power" of any atmosphere, has furnished new and additional proof, and has given an impetus to the study of ventilation problems.

A physicist might have deduced that proper cooling would be of prime importance. Whenever energy transformations take place in engines (heat engines), heat is always a waste by-product. On theoretical grounds, this must always be the case. No engine can or ever will be made one hundred per cent efficient. The steam engine dissipates unusable heat in its exhaust steam and by radiation, the motor car engine by its exhaust gases and its radiator, and man, a chemical "engine", by his exhaled air (his exhaust gases) and by his skin (his radiator). This waste heat is an unavoidable result of the operation of all engines, man included, and varies in amount with the conditions of operation; and for satisfactory results the rate at which it is taken away from the engine must be neither too rapid nor too slow. In man the principal dissipator of waste heat is the skin, working through the medium of the atmosphere by radiation (heat waves in the ether), by conduction, by convection, and by evaporation. In the white skinned race, the first is a negligible factor and may be ignored. Of the other three, conduction is influenced by temperature, convection by air velocity, and evaporation by air velocity and humidity. It follows that the prime essential of satisfactory ventilation is the provision of an atmosphere of such *temperature, air velocity, and humidity*, that the individual is cooled by that amount which induces the greatest degree of

comfort and the greatest efficiency in work.

Until recently there has been no accurate standard by which to measure comfort, in other words to measure the cooling power at all possible combinations of temperature, air velocity, and humidity. Houghten, Yagloglou, and Miller<sup>2</sup> have done this effectively, having produced graphic charts which measure comfort on a semi-artificial scale, which they have called a scale of "effective temperatures." These charts are simple and show accurately and quickly the changes necessary to produce any desired result in any one or more of the three factors.

While it is possible by adjusting the humidity and the air velocity to make the individual just as comfortable at 90° as at 67°, authorities are fairly well agreed that good ventilation for the healthy sedentary worker should provide:—

- (1) An air temperature of 66°-68°F.
- (2) Atmospheric movements of an inconstant or oscillatory character; the maximum velocities being of the order of 0.6 feet per second.<sup>3</sup>
- (3) A humidity such that the wet-bulb thermometer will stand at 56°F.<sup>4</sup>

The considerations which have determined these standards are:—

1. A temperature of 66°-68°F. is that at which large fluctuations in air velocity (draughts) and humidity have least effect on the senses.<sup>5</sup> Above 70° the rate of perspiration increases rapidly with rise of temperature, and the chilling effect of draughts is much greater than at the lower temperature; if the humidity be low, the effect is greater still.

2. Air movement is necessary to prevent the body becoming surrounded by an envelope of still warm air saturated with moisture, thereby preventing heat loss by evaporation. The movement should be intermittent and oscillatory, a condition conducive to equal cooling on all sides, and greater cooling of the head than the feet, an important factor in preventing congestion of the nasal mucosae.<sup>6</sup>

3. Maintaining the wet bulb at 56° by controlling humidification provides at

66°-68°, an atmosphere of such moistness (50 per cent of saturation, 3.68 grs. per cu. ft.) that evaporation of insensible perspiration is sufficiently rapid to prevent clamminess of the skin surface and clothing, while at the same time there is no undue desiccation of the respiratory passages. It provides in addition automatic buffering against temperature changes, through increased cooling by evaporation at higher temperatures and decreased cooling at lower. Suppose the temperature go to 73°, the relative humidity becomes 30 per cent of saturation, and the rate of evaporation of the perspiration now of increased amount, becomes brisk with the result that the increase of temperature, is not noticed.

Hitherto the tendency has been to regard a mechanically forced air supply, using fans the so-called plenum systems—as the best for schools and auditoria, large and small, since they can be made to meet accepted standards in heating and humidification, *if properly handled*, and in spite of the fact that the air movements obtained are neither intermittent nor oscillatory and are excessive at some places and almost nil at others.

Recently Greenburg<sup>7</sup> in a paper on the ventilation laws and standards of his country makes a plea for abandoning all mechanical systems in school rooms and small auditoria housing *under one hundred people* and reverting to the use of open windows for supply with gravity for exhaust, and direct radiation for heating. He stresses and agrees with the conclusions of the New York State Commission on Ventilation<sup>8</sup> that window supply, which readily meets the demands for intermittent and oscillatory air motion, gives greater comfort at 67° than the mechanical systems at 69°, and what is of vastly greater importance, a reduction of fifteen per cent in the total morbidity rate and forty-one per cent in the respiratory morbidity rate can be effected. He cites also the low cost of installation and maintenance of window supply systems, and their simplicity of operation. Expert supervision of a very high order is necessary for mechanical systems and is seldom supplied. To illustrate, it

might be mentioned that the most elaborately equipped office building in Canada, with a ventilation system as perfect as money and engineering skill could make it, was on completion turned over to an engineer who "thought that the water curtains were for cooling the air during hot weather" with the result that for five years the equipment was considered to be useless and unworkable. The place felt like a Turkish bath in August and was very draughty in February.

Greenburg writes from the New England seaboard with a climate more moist and equable than ours, and it may be doubted whether he would advise his preferred system for school rooms in the prairie provinces or even in the East. While direct radiation can supply the heat, and the requisite air motion is with some care obtainable from windows, the difficult matter of humidification is not met. Outside air in mid winter, on cold dry days particularly, contains so little moisture, that, when heated to room temperature without humidification, it becomes drier than the Sahara, and one must have Sahara temperatures to be

comfortable in it: actually 74°F. with still air is required for comfort equaling standard conditions. In such places the head is stuffy from swollen turbinates and the slightest draught produces a chilly sensation. Probably our high incidence of chronic rhinitis is due to such indoor conditions, and many investigators have shown that such conditions are conducive to high morbidity rates. Improvised evaporators attached to radiators are, as usually made, hopelessly inadequate to correct the lack of moisture; obviously so when it is remembered that to every cubic foot of outside air brought in on a cold day at least 3 grs. of water must be added to bring its content to the prescribed level of 3.7 grs. per cu. ft.

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- C. C. BIRCHARD

## MYOPIA AND ITS TREATMENT

**W**HILE myopia is brought about in a number of ways, short-sightedness as generally understood (axial myopia) is due to an elongation of the posterior half of the eyeball, with the posterior pole as the site of greatest change. This malformation brings in its train a large series of untoward effects. With the lengthening of the eye a marked change takes place in its refraction. Parallel rays of light fall now not upon, but in front of, the retina; and distant vision is impaired. The school board and objects of nature become alike a meaningless blur. As a result, not only is the myopic child's intellectual progress impaired, but its physical activities are restricted, and even its mental outlook may be influenced in an unfavourable way. Moreover, be-

cause in order to see objects clearly the myope must either approach them or bring them closer to him, those so affected are prone to develop postural defects that tend of themselves to increase the short-sightedness.

Much more serious are the pathological changes that develop within the globe mainly as the result of the inability of the retina, the choroid, and the elastic lamina to stretch equally with the sclera. Among them are congestion of the optic nerve and retina, chorio-retinitis with areas of atrophy about the optic disc and in the macular area, haemorrhages, and detachment of the retina. All these entail a loss of central (reading) vision that varies from slight diminution to complete blindness. About thirteen per cent of all

cases of total blindness are due to short-sightedness. One might comment further on the effect of myopia in producing weakness of the muscles of convergence and divergent strabismus, and on the accompanying pain and discomfort, the headache and reflex symptoms (asthenopia) that are present from the outset: but enough has been said to emphasize the gravity of the disorder.

No entirely satisfactory explanation has as yet been advanced regarding the precise mode of development of axial myopia; but among the contributing factors two causes play a predominant part. The one is a weakness of the scleral coat, either of congenital origin or the result of nutritive disturbances; and the other is prolonged application of the eyes for near work, such as is entailed by certain occupations, or is imposed by the necessities of modern school life. Simple at first glance as these factors may appear to be, they yet present a therapeutic problem of the broadest character.

The treatment of myopia begins properly with its prevention. This leads us at once into the whole subject of school hygiene. A healthful situation for the school building, adequate playgrounds, and a good system of ventilation, in promoting the general welfare of the child, exert a definite influence upon the strength of the scleral coat of the eye. Equally important, looking to the same result, is the removal of all physical defects, the regulation of the diet, and insistence upon adequate sleep and correct habits. In combating the second factor—excessive and prolonged convergence of the eyes—thought must be taken of lighting, seating, blackboards, and print and paper; while the early detection and correction of an initial weakness of sight is also of great importance. A routine medical examination of all school children provides the sole opportunity of studying the physical problems of the individual pupil.

In the treatment of developed myopia the full and accurate correction of the error of refraction stands as the first therapeutic measure. This, which alone can be successfully done under atropine

mydriasis, acts beneficially in several ways. In enabling the student to again assume an erect position, it reduces the degree of convergence and lessens the tendency to congestion of the eyes; it eliminates stooping and reacts favourably upon respiration; and it promotes the intellectual and moral development of the child through the acquisition of clear ocular perceptions. Following the prescription of glasses, every effort is made to better the patient's health along the lines previously indicated; and reading is restricted proportionately to the degree of short-sightedness. Generally speaking, myopia can be successfully controlled by the adoption of these measures; but in certain cases the short-sightedness continues to develop in spite of everything that can be done. Under these circumstances no course is left but to order the removal of the children from school; to tell the parents that any further education can only be obtained at a possible cost of blindness in the later years of life; and to suggest careers that can be more safely followed.

The great difficulty in the treatment of high myopia is our inability under present conditions to prevent excessive use of the eyes for close work. Our educational authorities in Canada have not realised and met the needs of our short-sighted children as have those of other countries. As things now stand it is impossible for bad cases to maintain their standing—or, even to receive any sort of education—without grave risks. Our school curricula should be made sufficiently elastic to permit pupils seriously affected to cover the prescribed courses in periods longer than those required of children with normal vision. In rapidly progressive cases of high degree (malignant myopia) home study, which, in any case, is now demanded to an extent beyond all reason, should be entirely interdicted, and instruction carried on in what have come to be known as 'myope' classes. In these, small groups of short-sighted pupils prepare their work in isolated rooms, where teaching is done orally and by means of the blackboard before joining

the main classes for recitations. The value of this method, successfully followed in Great Britain for over a decade, has been again emphasized in a recent report of the Council of British ophthalmologists; and in this connection it has been lately pointed out that the educational possibilities of broadcasting and the phonograph, of the epidiascope and the cine-

matograph are as yet a practically unexplored field.

In conclusion, the writer would emphasize the fact that myopia in all its phases is a pathological condition, and that it is as unwise as it is illogical to entrust the treatment and management of myopic children to any but qualified members of the medical profession.

W. GORDON M. BYERS

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## THE INVESTIGATION OF THE STRUCTURE OF THE EYE AND OF PATHOLOGICAL CHANGE IN IT BY MEANS OF VARIOUS LIGHT RAYS

THE paper by Dr. Leonhard Koeppe, translated by Dr. Clarence King, on "The Limitations of Slitlamp Microscopy of the Living Eye," (*A. J. Ophth.* Mar. 26.) affords a striking example of the application of physical methods to the investigation of structure and pathological changes. The title of the paper is somewhat misleading as it deals more with an extended application than with limitation, and some new practical facts are established and important advances foreshadowed. No less than six new methods of using the instrument are reviewed and in the following paragraphs some of the more striking observations are noted.

1. *Stereomicroscopy with polarized light.* By this means the intra-lamellar substance of the cornea may be made to appear as a complicated system of dark lines of a peculiar radiating pattern, which render visible the shape and position of the corneal cells. In the lens too, the course of the fibres can be traced between the sutures, more clearly than with ordinary light. The positions of Bowman's and of Descemet's membrane can be seen as well as those of the anterior and posterior capsules of the lens; these structures cause a striking display of reflected coloured polarized light although they cannot be actually seen. Still more marked is the effect when the cornea, made to appear dark in colour, is contrasted against existing scar tissue lighted in complementary colours, enabling the minutest ramifications of the pathological

tissue to be traced. In addition, by the power of this light to analyze structure, the presence of glass in the transparent tissues of the eye may be determined, a matter ordinarily of great difficulty.

2. *Stereo ultra-microscopy.* This is made possible by means of Koeppe's contact glass, which throws a beam of light into the cornea perpendicular to the axis of the microscope. As the significance of bodies, so small that they cannot be seen, but only the disturbance which they cause in light waves made visible, is not known, the method is of experimental rather than of clinical interest but may yet be used for the detection of filter-passing virus.

3. *Diffraction grating effects open a most interesting field for investigation.* The angular radius of the coloured rings given by corneal tissue is about  $1.5^\circ$ , that of the lens  $3.5^\circ$ — $4^\circ$ , while the calculated value of the rings from the vitreous is about  $7^\circ$ . Since the value for the rings occurring in glaucoma is given as  $5.5^\circ$  to  $8^\circ$ , they cannot be due to the corneal tissue as previously held, but as the lower value  $5.5^\circ$  is less than that of the vitreous, further investigation is indicated.

4. *Fluorescent or ultra violet light.* Several practical points are referred to under this heading and methods are given for excluding harmful rays (under  $300 \mu\mu$ ) and for using longer rays ( $3$ — $400 \mu\mu$ ) as well as some violet rays for the sake of visibility.

The demonstration of cholesterine in the tissues in certain degenerative conditions and its distinction from amorphous particles by its rhomboid crystals, is referred to, as is the interesting statement that it is always present with papilloedema but never with optic neuritis. It has been shown too, that the glistening in synchisis scintillans is not due to cholesteroline, but to an amorphous substance, which tends to support the claim of Verhoff that the particles seen in this condition are of a soapy nature. The observations of Thiel, that following the ingestion of fluorescein the dye can be seen issuing from the pupil, (not from the iris), when the ciliary body is inflamed but not when normal, are important: a positive result is obtained also when glaucoma is present, not only in the diseased eye but in the presumably unafflicted one, making very early diagnosis possible.

5. *Nothing very important has been derived from "Spectroscopy."* The spectrum of haematoxilin can be seen following jaundice after the icterus has disappeared

and that of oxyhaemoglobin following haemorrhage or inflammation but no practical application of these results is evident.

6. *Roentgen optic microscopy* has been used on tissue removed from the eye, to investigate structure and double refraction, but the method has not as yet been developed. Sir Wm. Bragg, as is well known, has been using these rays not only in the analysis of molecular but of atomic structure and to work on the living eye with such minute waves, (roughly,  $1/10,000$ th of the shortest light waves) a highly special technique must be evolved.

Aside from the use of fluorescein in the diagnosis of glaucoma, the most practical application arising from this work is the suggestion to determine the intra-ocular tension by purely optical means, since the so-called accidental double refraction varies directly with the tension. Although many of the foregoing statements must for the present be taken as not proven, the outlook afforded for further development is most encouraging.

R. KERRY

#### REPORT OF THE COAL COMMISSION IN ENGLAND

ATTENTION has been called in an editorial in the *British Medical Journal* of March 20, 1926, to the recent report of the Coal Commission in Great Britain—and its remarks have a particular interest for Canadians at the present.

This report states that so far as it can be estimated 3,000,000 tons of soot are discharged into the air annually by the chimneys of Great Britain, an amount equal in weight to three days' output of all its collieries. In other words, the work of over a million men for three days every year is devoted to providing the soot which pollutes the atmosphere. Liquid fuels and gas can be obtained from coal, and if the bulk of the 147,000,000 tons of coal now consumed in the raw state was converted into liquid fuel the greater part of the country's requirements for oil could be supplied from home sources, and its com-

bustion rendered smokeless as well as a great deal more energy producing. By distillation of coal in gas ovens not only can gas be obtained for lighting, heating, cooking and for power to produce electricity, but also a large supply of coke would be obtained together with many valuable by-products, such as tar and its derivatives, oil, t.n.t. explosive, dyes, and numerous valuable chemical products; at the same time in place of polluting the atmosphere with the acid sulphur products which do so much harm, not only to surrounding vegetation, but to all stone buildings, ammonium sulphate would be obtained which is a most valuable fertilizer. Furthermore in place of obtaining a mere ten per cent of the energy value of raw coal and wasting the ninety per cent in smoke, a much larger percentage of energy would be obtainable in this converted state. The

present method of using coal can only be regarded as a most wasteful, and un-economical use of the store of energy nature has given to the country, and on which the prosperity and sustenance of the present population depends. The President of the Royal Society has warned us that the dream of enormous stores of energy which the future may supply by the disruption of atoms is not at all likely to come true. With the exhaustion of its coal supply will vanish the power of Great Britain. Associated with this definite waste of coal is the enormous economic loss due to the smoke pollution of the atmosphere, with all the destructive and corrosive properties inherent in

such smoke, and the loss of health by limitation of the sun's rays. It would not be extravagant to put down the annual loss to the country by this un-economical use of coal at £100,000,000 annually. Observations taken daily at the National Institute for Medical Research would indicate that the loss of the ultra-violet radiation due to smoke pollution in London is one half to two thirds of its actual value. The inhabitants of Great Britain must appreciate what this tremendous annual loss implies; and the medical profession should use all its influence in promoting the general adoption of smokeless fuel both in that country and in Canada.

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### THE OPIUM EVIL IN INDIA

IN a small pamphlet of sixty-three pages issued by the Student Christian Movement, an attempt has been made to show the extent of the opium evil in India. A growing addiction to the use of opium is stated to be taking place in many of the industrial centres. Assuming the League of Nations' figure of 12 pounds per 10,000 of the population as representing the amount of drug required for medical and legitimate purposes the quantity stated to be consumed in Bombay is said to reach 88 pounds, in Rangoon 216 pounds, and in Calcutta 288 pounds per 10,000 inhabitants. The doping of children with opium pills by mothers working in cotton mills is said to be unduly prevalent. In Burma the consumption of opium is chiefly by smoking, and though a system of registration was attempted, this appears to have broken down owing to the open sales which were allowed to others who were not Burmese. The Assam opium enquiry which was undertaken at the instance of the All India Congress Committee has also been going on actively, and its sub-committee reports that the opium habit is by no means as innocuous as it has been represented, and that opium smoking is being practised in many parts of India besides

Burma. The report admits its political sympathy with the non-cooperative movement of Mahatma Ghandi, and attributes any reduction in the opium smoking which has taken place since 1921 to his influence and teaching. It would appear that the Indian Government has been influenced by these reports, and in opening the Council of State in February the Viceroy announced a new policy of the Indian Government which will be welcomed by many but which can only be regarded as a complete reversal of its previous policy described by its representative at Geneva as that of deriving the maximum of revenue from the minimum of consumption. This change of policy was declared by the Viceroy to be in accordance with the trend of modern opinion, and with views freely expressed in some quarters and on different occasions in India. This new policy is intended to reduce progressively the export of opium to all destinations, so as to extinguish the trade altogether within a definite period excepting that for strictly medicinal purposes. This policy will involve also a corresponding reduction in the amount produced.

## ON MORPHINE AND HEROIN ADDICTION

**I**N an editorial on the prevalence of heroin and morphine addiction in England, the *Lancet* of Jan. 27, writes—Addiction to morphine or heroin is said to be rare in England and to be growing rarer. Addiction it would seem is more readily induced by the use of heroin than by that of morphine. Inherent mental or nervous instability is an important predisposing cause as is also chronic pain, distress, insomnia, overwork and anxiety. Special care is needed in the case of young patients. Insofar as addiction is due to an attempt to relieve pain or to the influence and example of other addicts or to indulgence out of curiosity or bravado, it would appear likely to diminish rapidly in the future under the restric-

tion of modern legislation. The committee examined at the same time evidence of the relative values of the different methods of treatment of addiction; the abrupt withdrawal, the rapid withdrawal, and the gradual withdrawal. The last of these was considered more generally suitable and more free from risk, entailing less strain upon the patient, and was not so liable to be attended by collapse. The most sanguine witnesses did not claim a higher proportion of lasting cures than fifteen to twenty per cent. Permanent cure is the exception. Relapse is the rule. More successful results in all probability could be obtained if the country possessed more institutions where special treatment was available.

## TREATMENT WITH ARTIFICIAL LIGHT IN GLASGOW CLINICS

**A**RTIFICIAL light is now being employed in several centres in Glasgow, and a report of the methods used has recently been issued by the Public Health Department. The fitful appearance of the sun and the relatively weak actinic value of its rays render heliotherapy difficult to carry out, and to obtain good results resort must be had to artificial sources of the ultra violet rays. It might have added that the heavy cloud of smoke which hangs over Glasgow robs its citizens of a large percentage of the rays that nature and the sun intended for them. The clinic at Robroyston in the neighbourhood of Glasgow is an indoor one, and mercury vapour lamps of from twenty to seventy-five amperes are employed. Eight sitting patients can be grouped around two seventy-five ampere lamps, while from four to six patients can be irradiated by three twenty ampere lamps. The treatment given consists of general irradiation. The patients entirely naked save for very short pants sit at a distance of about one metre on either side of the lamps which are not covered by glass. The initial

exposure is of twenty minutes, in some cases less, and the patients are instructed to turn every five minutes so that the back and front are alternately exposed. Every fourth day an additional exposure of five minutes is given. All ambulant patients except those in whom some special contraindication exists receive a tepid to cold spray on emerging from the light room. Bed patients are sponged down by their nurse. This procedure not only increases the tonic effects of the exposure but prevents the patient from taking cold. Up to the present 102 patients have been treated, chiefly cases of lupus, and tuberculosis of the glands, joints, bones and lungs. The Director remarks that one of the most striking features of the treatment is the rapid improvement in general health. In only two or three cases do they fail to show a steady gain in body weight. Twenty-three cases of glandular tuberculosis, mostly cervical, have been treated. In all improvement has resulted. In the sinus cases healing has been rapid. Excellent results also have been obtained in tuberculosis of the elbow, ankle and

wrist joints. In tuberculosis of the lungs light therapy would appear to be beneficial, but sufficient time has not yet elapsed to allow judgment to be made of

the ultimate results. From the report it appears that useful work is being done which is not able to be accomplished by other modes of treatment.

### EXPERIENCES IN DEEP DIVING

CAPTAIN C. C. DAMANT who was in charge of operations in recovering from the bottom of the Atlantic the gold and other valuables sunk when the S. S. *Laurentic* foundered, has given an interesting account of the experiences met with by the divers. (*Jour. Hygiene*, 1926, xxv, 26; *Lancet*, April 3, 1926). Before he attempted retrieving this bullion, he studied the questions connected with compressed air illness very carefully with the assistance of Professor J. S. Haldane. The rules formulated were based on the rates at which the body becomes saturated with nitrogen in compressed air and at which it gets rid of the excess on returning to atmospheric pressure. Experience showed that a greater length of time was required between each dive to get rid of the last of the excess nitrogen absorbed than had been supposed. Lengthening the interval between the dives from one and a half hours to four hours proved to be insufficient to make the second dive as safe as the first. About 5,000 dives were made under a pressure of about 55 lbs. per square inch with only

thirty-one cases of illness. In one case there was temporary blindness, one was paraplegic, and two or three others had serious nervous symptoms. The pains in and about the joints known as "bends" were the most frequent trouble. An adequate recompression chamber was provided on board the diving ship, giving a feeling of confidence to everyone and proved effective in curing all the cases of illness. Violent muscular work during the ascent from the bottom seemed to help prevent the development of symptoms, and breathing oxygen after reaching the surface appeared to be of value. The operations were much interfered with by violent winds which not only prevented diving operations but broke up the ship, so that the divers on their return found the gold buried at the bottom of the ruins. Notwithstanding this difficulty more than 98 percent of the bullion was retrieved, and that without loss of life or injury. The whole proved a brilliant triumph of applied physiology.

### Editorial Comments

#### OSLER MEMORIAL VOLUME

It is not often that we may conscientiously refer to a biographical work as being unique in literature, and yet such is the *Osler Memorial Volume*, which, in its 600 pages, brings into remarkable relief the history of this famous man. Memorializing his life in a series of articles dealing with his career according to its four great periods, the book tells with ever-increasing interest of his remarkable intellectual develop-

ment. The work is in no sense a rival to, nor an alternative for, Harvey Cushing's "Life". On the contrary, it is complementary to it and satisfies a very proper desire for more information as to his scientific achievements.

The outstanding feature of the work is undoubtedly the classified and annotated bibliography, (150 pages), which is in reality a work of reference for the student of medicine. The publications here listed are grouped in chronological order under seven rubries: Natural

Sciences; Pathology; Clinical Medicine; Literary and Historical; Educational; Welfare Activities; and Volumes Edited.

A work of this kind will live for all time, not alone as a biography, but as a comprehensive book of reference for physicians; nor can any reader fail to be inspired with a love of the humanities in the broadest sense of the term. There is not a physician in any field of medical work who will not find something in this volume—the fulfilment of a desire for useful information in a wide field of medicine and an incentive to further research and literary achievement. Canadians have every reason to be proud of the conspicuous part which Dr. Maude Abbott has played in the completion of this volume.

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#### ACCIDENT PREVENTION AMONG SCHOOL CHILDREN

An attempt has been made by the Industrial Safety Survey in Great Britain to study accident prevention among school children. In their study of the problems the personal factor of carelessness was recognized to be far more responsible for injuries, than any obvious risk such as unguarded machinery. This personal factor appeared to depend partly on a careless ignoring of risk and partly upon a definite predisposition arising from a condition of ill health. No means of avoiding accidents in the opinion of those investigating, offered possibilities of greater value than a widespread scheme of safety education in schools, as an introduction to the prevention of accidents in industry. In this education accidents are divided into groups, such as street accidents, and accidents from fire, falls, and so forth; one group to be selected for each month of the school year. Safety committees are formed among the children. Scouts are set to guard street crossings, coming to and leaving school. Newspaper reports of accidents are studied, discussed, and essays are written. In outside school hours, fire drill and other games give opportunities for teaching younger children. The scheme does not discourage facing the element of danger, but teaches the right and most efficient way to meet it and avoid it. Awkward cautious children often appear more apt to get hurt than the child who apparently takes chances, but whose senses are keen, and whose body is responsive

and under perfect control. Under this training accidents are beginning to show a decrease since the introduction of this form of safety education.

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#### AMERICAN HEALTH CONGRESS

Amongst the more important sessions to be held in this connection we notice that which is to take place on Friday afternoon May 21st, when the American Public Health Association, American Child Health Association, the National Organization for Public Health Nursing and the Conference of State and Provincial Health Authorities of North America meet together to consider the public health administration of communities. Three plans for the health administration of cities will be described by the men who have developed them: Professor C. E. A. Winslow, Dr. S. J. Crumbine, Dr. Murray P. Horwood, Dr. Harold H. Mitchel, Dr. B. Franklin Royer, Mr. Edward Stuart, Professor Ira V. Hiscock, Assistant Professor of Public Health, Yale School of Medicine. A fourth health plan—for the county health organization—will be presented by Dr. Joseph W. Mountin, Director of Rural Sanitation, Board of Health, Jefferson City, Mo. Not only will these men describe their plans but men and women engaged in health administration in all parts of the country will be present and enter into a free discussion which can do more toward the evolution of public health standards than years of individual uncompanied work.

Other subjects which will be discussed at joint sessions during this congress will be "Light and Health" presided over by Dr. Wm. J. Bell of the Department of Health, Toronto; "Newer Methods for the Control of Infectious Diseases"; "Venereal Disease" and "Industrial Pollution of Water".

In connection with public health the National Committee for Mental Hygiene has arranged sixteen round table discussions under the leadership of prominent workers in this field. Adult education, the instruction of nurses in acquainting communities with their work, and various other questions of the day will receive full attention.

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Mr. Samuel Augustine Courtauld who in 1924 endowed the chair of Anatomy at the Middlesex Hospital Medical School with the sum of £20,000

has now presented to the hospital an additional £30,000 for the erection of an institute for teaching and research in biochemistry. A seven storey building is to be erected adjacent to the hospital and placed under the administrative charge of Dr. E. C. Dodds, professor of biochemistry in the University of London. When erected it will be complete in all its departments, and will be closely associated with the Bland Sutton Institute of Pathology directed by Professor James McIntosh.

Our knowledge of the chemistry of living tissues though very imperfect has been rapidly extended during recent years. The conditions of health and disease are now much better understood, and new vistas of research are being opened. One of them, the isolation of the more important internal secretions which play so large a part in human life is now on the way to its accomplishment, and a pressing need of the moment is the creation of some system of standardization for the various organic preparations already on the market. Chemotherapeutic investigations provide another field from which practical results may be expected. With abundance of clinical material for study, with the obligation of teaching, and the duty of acquiring new knowledge it is hoped that the institute will in the future occupy a prominent position in research itself and be of assistance to research in other quarters.

### THE ARCHIVES OF DISEASE IN CHILDHOOD

A new publication by the British Medical Association, entitled *Archives of Disease in Childhood*, has recently been issued in its first number, and will in future be issued six times yearly, under the editorship of Hugh Thrusfield and Reginald Miller, assisted by a consulting staff of seven physicians notable in English pediatrics. The *Journal* is introduced with a statement by Sir Thomas Barlow who sets forth the reasons for the publication of the *Archives*, and points out the many problems in the diseases of children which need investigation; rickets, and its relation to various foods; congenital syphilis; artificial feeding of infants; rheumatism in children, and immunization.

The first number is well printed on good paper and profusely illustrated, with some pictures in colour. Included in this number are extensive articles on hepatic cirrhosis in children, purpura haemorrhagica, rickets, and some interesting shorter articles.

The editors are to be congratulated on the appearance of the periodical. For many years there has been desire on the part of pediatricians on the northern half of this continent to keep in touch with the problems and work of the British school, and the new publication will, it is expected, fill a long felt want.

## Correspondence

### THE BANTING RESEARCH FUND

To the Editor:

A little over a year ago the Banting Research Foundation was organized, and during the past summer half a million dollars as an endowment fund was collected, the interest from which will presently be available.

The objects of this fund are (a) to supplement the sum at present available in the University of Toronto for the carrying on of research in connection with the Banting and Best Chair of Medical Research and (b) to make grants to research workers who have definite problems of medical research which owing to lack of funds they cannot adequately carry out.

As the Trustees have power to make grants to such persons as present evidence of having definite problems which they cannot prosecute for lack of financial aid, whether they intend to work in Toronto or elsewhere, and are naturally anxious to be of as great assistance to medical research as the relatively limited income that they have at their disposal will allow, I am instructed to ask you to publish this letter in order that the existence and availability of this fund may become known to the members of your Association.

Applicants should set forth the problem and the method for its solution; the character of financial aid required, (a) apparatus and supplies, (b) other costs such as animals, as nearly as can

be estimated, (c) grants towards living expenses of worker involved. This should be accompanied by a statement of what facilities are available in the place where he wishes to work, if not in Toronto, and a statement which would show that such expenses cannot be borne locally.

Such applications will be submitted to an Advisory Committee for report before a grant is made.

The Trustees of the Foundation are: Sir Robert Falconer, K.C.M.G., D.Litt., L.L.D., D.D., Edin., D.C.L. Oxon., Chairman; C. S. Macdonald, Esq., M.A., Vice-Chairman; Lieutenant Colonel R. W. Leonard, Honorary Treasurer; The Reverend Canon H. J. Cody, D.D., L.L.D.; W. E. Gallie, M.D., F.A.C.S., F.R.S.C. Eng.; Professor V. E. Henderson, M.A., M.B.; Professor J. G. Fitzgerald, M.D., L.L.D., F.R.S.C.; John W. Rogers, Esq.

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Professor C. L. Starr, University of Toronto.

Applications should be addressed to Mr. F. Lorne Hutchison, Honorary Secretary, Banting Research Foundation, Toronto 5.

Yours sincerely,

F. LORNE HUTCHISON

TORONTO, April 9, 1926

*Hon. Secretary.*

## ADVERTISEMENT OF COD LIVER OIL.

To the Editor,

In the September 1925 issue of the *Canadian Medical Association Journal* I published an article on "Deficiency Diseases of Children." In this article was emphasized the importance of the routine use of an active (biologically tested) cod liver oil for the prevention and cure of rickets and tetany.

During the past few months a reprint of this article with an advertisement of the Ayerst, McKenna & Harrison brand of biologically tested Newfoundland cod liver oil on the front and back pages has been widely distributed to the

medical profession of Canada. This was done without the knowledge of the author.

It might be inferred from the reprint and its accompanying advertisement that the Hospital for Sick Children of Toronto uses and recommends the Ayerst brand of cod liver oil. This is not the case.

Yours very truly,

Hospital for Sick Children,  
TORONTO. April 19, 1926

FREDERICK F. TISPALL, M.D.

## STANDARDIZATION OF DIGITALIS

To the Editor:—

The paper by Dr. W. F. Ward on the potency of the tinctures of digitalis and strophanthus which appeared in the April number of the *Journal* is one of great value to the whole profession. There are few drugs from which the practitioner hopes to get more definite results than these, and the doubt that Dr. Ward has thrown upon their reliability is a grave one, but is in full accord with what Drs. D. S. Lewis and C. F. Moffat found more than five years ago when the cat was the test animal used.

A bad workman complains of his tools but a good one may also do so when the efficiency of these varies so much.

The pharmacological testing of digitalis and strophantus is the only test of any real value as chemically it is impossible to come to any conclusion. Even the biological tests are subject to much variation. Dr. Ward uses the frog method and says that the reaction of these animals varies not only with the species but also with the state of sexual activity and very much with the season of the year, so the tests must be done with great care to be of value. But seeing that we have no better standard it is very gratifying to know that the Department of Health is now doing this most necessary work, and one must hope that it will also be used with other drugs which are only open to similar standardization.

The samples of tinctures for the tests were gathered in the open market and I understand were all of Canadian manufacture but one would like to be assured of this. The U. S. Pharmacopeia lays down the rule that digitalis and strophanthus must be biologically tested, but apparently this standard is not insisted upon by the American or any other government, so that we have no guarantee except the standing of the

firms concerned. After reading Dr. Ward's paper the Canadian practitioner will feel inclined to order American tinctures, and one would like to be quite sure than in thus doing he is getting a better article than he could otherwise do. But even if the tincture be strictly of required strength all patients do not react in the same way to the same dose and hence the objection to any hard

and fast rule as to dosage. The doctor will still do well if, after he has prescribed the drugs from the best firm possible, he relies chiefly on the reaction of his patient as to the dosage and the continuance of the medicines.

Yours Truly

R. D. RUDOLF

TORONTO, April 19th, 1926.

### Men and Books

#### THE KING'S EVIL AND THE ROYAL TOUCH\*

BY PROF. C. T. CURRELLY

*Toronto*

In giving this very short account of "touch-pieces" used in connection with the curing of the disease known as the "King's Evil" (scrofula), I wish to state that there is nothing original whatever.

The subject is one of peculiar interest as an overlapping from medicine into numismatics, and as a study of human conditions. It is, moreover, of great importance in the study of the system of government by kings. Perhaps its greatest importance, however, has been in providing an excellent subject for dispute between the medical men of England and France; I think you will all agree with me that nothing can be quite as important in human affairs as a matter that will provide a thoroughly good subject of dispute between scientific men.

In the first place we must consider the idea of royalty in its attempt to draw itself apart from the ordinary citizen of the state. With what is practically the dawn of history in Egypt, we find the attempt on the part of kings and their immediate henchmen to guard themselves by assuming the halo of something superhuman, either as the reincarnation of some famous ancestor or through some connection with a deity. At quite an early time in Egypt the claim was definitely advanced that the king was not the son of his reputed father but the son of the god Amen, who came to his mother in the form of his father. The king was therefore of direct, divine parentage and consequently under

the protection of his father and with the super-human powers that went with such an origin.

The deification of Roman emperors followed quite naturally on this very widely spread idea; and with the founding of the Western Empire of Charlemagne, it is not at all strange to find the king of France laying claim to special powers received directly from the Deity. Part of this claim was based upon the fact that he was anointed with holy oil sent straight from heaven in a bottle that was preserved at Rheims, where the kings were crowned.

The first authentic example we have of the use of the royal touch is that Robert the Pious, in the first quarter of the eleventh century, touched scrofulous patients and cured them. It so happened that at that time Edward the Saxon was living with his mother in Normandy. On his return to England he tried to perform the same miracle, and he succeeded. The patient was brought before the King, who touched him and offered prayer for him, and he was then kept in bed and board by the King till cured. I am told that few better treatments have yet been developed. The good living, without worry, the complete faith, the tremendous sense of importance, and the probable amusement, provided the scrofulous patient with practically every chance of making a rapid recovery.

When William the Norman took the throne he seems to have thought it unwise to make any such claim, and trusted more to his good Norman men-at-arms than to any divine right as the king of England. This state of affairs continued until the time of Henry II. Henry's mother was of the family of Edward the Confessor, so the King felt that he had whatever divine rights pertained to the Confessor's family. Moreover, he was married to that interesting and dominating woman, Eleanor of Aquitaine, who had passed so

\*Read at the Stated Meeting, Academy of Medicine, Toronto, Jan. 5, 1925.

much time at the ultra-pious court of her first husband, Louis VII of France, where doubtless she had seen the tremendous effect upon the people of the king's use of the royal touch. At any rate Henry reintroduced the practice, and with success. From then on it was an accepted part of the duties of the English king to touch scrofulous patients; and though I believe the continued feeding of them was given up, a money present, was substituted. If they were poor people there is no doubt that the importance they acquired among their neighbours from being touched by the king, would increase greatly the number of free meals they would receive, and this, together with the cheer and rejoicing over their probable recovery, would maintain the general high feeding so necessary.

With the death of Richard III, you will realize there came to an end any very legitimate claim to an hereditary divine power. Henry VII, the Welsh gentleman, had a rather remote claim to represent the royal blood of Edward III. He was, however, a man of great shrewdness, and realized how enormously his position would be strengthened if divine sanction of his kingship, implied in the power to heal by the royal touch, should be given before the face of the people. He determined, therefore, to add all the human elements possible, and to explain further I must go back to treat very briefly of the English coinage.

Charlemagne, even before he became emperor on the famous Christmas day of 800, had issued a very good silver penny to replace the much muddled coinage then in circulation. Gold had become rare, and the silver coinage was all that was in common use. With the great development of trade in the thirteenth century, Florence first, in 1252, issued a gold florin. This example was followed by other Italian cities, notably Venice. The English did not really adopt a gold coinage till after the battle of Sluys, when Edward III struck his beautiful and famous noble. On it was a ship bearing the king, and the legend *IHS autem transiens per medium illorum ibat*, from Luke IV.30 (Jesus, moreover, passing through the midst of them, went his way.) In some unaccountable way this legend became a great talisman against many evils, including thieves. Why this particular passage of Scripture should have been chosen, has given rise to much controversy and little satisfaction. However, the noble gained the position of a death-preventing amulet in battle, and a most potent

charm to have slung around one's neck. This coin was issued at the third of a pound or the half of a mark (both of these being moneys of account and not coined money) and, therefore, with the value of 6s. 8d. In course of time, with the fluctuation in the value of metals, it became worth 10s. As the sum of 6s. 8d. had come to be looked upon as a regular fee, in 1470 Edward IV issued a new coin of this value, which he called the angel. This had on one side a ship surmounted by the cross, and on the other, St. Michael slaying the dragon, and the legend *Per crucem tuam salva nos XPE Redemptor* (Through thy Cross save us Christ Redeemer.) This motto appealed strongly to the popular ideas of the time, and the coin seems to have taken on a considerable amount of sanctity. As the noble, when worth 6s. 8d. was regarded as a standard fee, so now was the angel, and you will find many a joke in Shakespeare and elsewhere on this matter. 6s. 8d. has remained till quite recently the standard fee, not only medical but legal. You will all doubtless remember a famous operation performed upon an eminent lawyer who swallowed a sovereign. As the gentleman was extremely popular, the best surgeons of London went to his assistance. A marvellous stomach-pump was invented for the occasion, and they succeeded in getting up 13s. 4d.

In all the earlier ideas of touching there seems to have been no regard to any particular place, time or ceremony; but the shrewd Henry VII realized that all such peculiar claims of royalty were like the old-fashioned muskets—they had a tremendous backkick—and his position was too insecure to neglect any detail that might strengthen it. He therefore made two innovations in the rite of royal healing. He introduced a somewhat impressive ceremony, and after passing his hands over the patient's sores and making the sign of the cross over his head, he hung an angel about the sick person's neck, instead of the silver penny given by his predecessors. This brings us to the part of the subject that we can illustrate, for, thanks to Dr. F. N. G. Starr, we have in the Royal Ontario Museum a singularly complete collection of these angels, which were called "touch-pieces," from the time of Henry VII to the last one issued by the Cardinal of York shortly before the English government bought up his somewhat flimsy claims to the English throne.

As I remarked, claims that may be very suitable at one time provide a sad series of pitfalls for a

later generation. Henry VII's patients had done very well, possibly from the number of good meals they got from admiring friends who wished to see the sacred angel that His Majesty had hung around their necks. With the accession of Mary, there came another question. Did this divine power operate through a woman? It did. So it did with Elizabeth. When James I came to London, he was faced with a difficulty on the side of kingship, as the Scottish kings had never claimed this divine power. His Scottish advisers felt it unwise to risk the matter; his English advisers felt that he could not avoid risking it. In addition to the angels for circulation James had "healing angels" specially minted for the ceremony of touching. The matter now began to come under medical discussion more frequently. The earlier writers, from Gilbert the Englishman, seem to have accepted it as a cure, with the reservation that occasionally it did not seem to work and the surgeon had to be called in. Charles I, with his French wife, made all the use of it he could, and great numbers were touched. This may point to greater popularity of the cure or perhaps to greater poverty and prevalence of the disease. When Charles' troubles came on, he passed through different stages, where the patient had to bring his own touch-piece as the King could not afford it, and where it was attempted

without the touch-piece. I think the most pathetic story of the unfortunate King's touching is where, when being led away to prison, a man piteously implored him, and the King was not allowed by his guards to touch the man. The sufferer, a publican named John Cole, received only the King's words, "God bless thee and grant thy desire." Feeling that this was of no use, Cole fell back upon a lotion recommended by an apothecary of Salisbury, and to the great surprise of himself and his friends, the sores began at once to heal and the scabs to appear upon the bottle.

Naturally, Cromwell would have nothing to do with the superstition, as he called it, of healing. When Charles II came to the throne he issued a small gold touch-piece, of smaller size but with the same general decoration as the angel. James II was forced to reduce the touch-piece to silver, as were his descendants, the Old and Young Pretenders and the Cardinal of York, the last Stuart claimant to the British throne.

Queen Anne touched great numbers of scrofulous people. Dr. Johnson was touched by her in his childhood, and the gold touch-piece given him is now in the British Museum; the royal touch failed, however, to cure him. Anne was the last of the reigning sovereigns to use the rite, the Hanoverian kings refusing to continue it.

## Medical Societies

### ON CHRONIC ARTHRITIS

*The Hugh Thomas Lecture at the Liverpool Medical Institute*

An address was recently delivered at the Liverpool Medical Institute by Prof. R. B. Osgood of Harvard University on the orthopaedic aspects of chronic arthritis (*Brit. M. J.*, Feb. 20, 1926). Disclaiming any share in the recent valuable experimental investigations carried on in laboratories he drew his conclusions chiefly from clinical experience. To most of the profession at present no etiological theory seemed so probable as the infectious theory, but we still lack conclusive proof of the specific nature of the infection, and still lack accurate knowledge of the abnormal physiological processes and biochemical derangements, which as primary factors initiate, or as secondary factors

prolong the symptom complexes with which we are familiar. He deprecated the common view that all cases of deforming arthritis represented different manifestations of the same disease.

Even if we are convinced that there is a common etiological factor-infection—we must recognize at least two clinical types running so true to form and exhibiting such distinct characteristics that in Dr. Osgood's opinion they must be regarded as separate disease entities. The first, rheumatoid arthritis was polyarticular, and of rapid onset, and was met with chiefly in youth and early adult life. Its lesions occurred mainly in the synovial membrane and frequently led to ankylosis. The second type known as osteoarthritis was of slow onset, monarticular in type, and occurred in middle life and old age. Its lesions attacked primarily the cartilage and bone, and in general did not lead to ankylosis.

In reference to rheumatoid arthritis Dr. Osgood stated that there was no conclusive proof of any specific organism which invaded the joint, and could be held responsible for the disease. Suggestive evidence is accumulating regarding the important part which faulty alimentation may play in the production of this disease. This type of arthritics, in the lecturer's opinion, do best on diets in which the carbohydrate calories are cut down to a low level. At the same time he believed with Garrod that everything which induced debility or lowered tone acts as a predisposing cause, and with Pemberton considered it probable that a variety of factors influenced its occurrence, i.e., various types of infections, exposure to wet and cold, intestinal disturbances, and endocrine imbalance. A clinical observation to which Goldthwaite has directed attention is the frequent incidence of the disease in the so-called congenital visceroptotic type of individual. The female sex is more susceptible to ptosis and to this disease than the male. Poor body mechanics, vasomotor changes, faulty alimentation, endocrine disturbance, and general lack of resistance to infection, all seem to be predisposing clinical factors, and the joint changes once initiated continue to progress unless general systemic resistance can be effectually raised. As regards treatment, Dr. Osgood does not consider that the general experience with vaccines and non-specific protein therapy has been of much service. Neither does he think that the surgical removal of possible foci of infection has been followed in the majority of cases by any amelioration of symptoms. While it may be of indubitable advantage to eradicate any focus of infection which may be regarded as responsible for any lowering of the general resistance, Dr. Osgood considered that the profession should hesitate to urge surgical and dental operations unless they are assured that the foci of infection are affecting the general health of the patient and are not themselves mere expressions of a lowered vitality. There is, however, much to suggest that the path is a very open one by which bacterial or chemical toxins may pass from the intestines, and especially from the colon to the joints. Careful attention should be given to securing a normal evacuation of the bowels; abdominal ptosis should be corrected, and a daily evacuation obtained by colonic irrigation or non-irritating

cathartics. The improvement which takes place after a normal rate of passage of the intestinal contents through the colon is secured, while perhaps not spectacular, is in Dr. Osgood's opinion frequently noticed and is distinct. Of drugs the speaker had little to say. The salicylates in his opinion may prove harmful to the digestive processes, and at no stage of the disease do they exert any beneficial effect on the course of the disease. In those cases, in which the readings of the basal metabolism tests are well below normal, the administration of thyroid extract in carefully graded doses, has proved advantageous. A lowered local blood supply may be helped by heliotherapy, radiant heat, and perhaps diathermy. Occupational therapy has also in these cases a definite value and special exercises taken in the recumbent position and designed to increase the vital capacity and relieve the ptosis are with us at Harvard prescribed as a routine. He also warned against prolonged fixation or splinting in this type, because it still further lowers the already low blood supply and thus increases the tendency to atrophy. In the acute stage, unless occasionally to relieve hypertension in a joint by aspiration, any surgical treatment is to be deprecated. Under more chronic conditions the surgical removal of fat fringes and pannus has given encouraging results. Joint resection may bring about better weight bearing lines. No success has followed attempts at arthroplasty for knee joints. In the treatment of rheumatoid arthritis of the spine while he may not be able to stop the ankylosing process, the surgeon should see to it that the lungs, heart and diaphragm suffer minimal interference from any advance of the deformity.

*Osteoarthritis*, called hypertrophic arthritis more generally in North America, has been the subject of less clinical investigation than rheumatoid arthritis. Exposure to cold and wet is an infrequent history; lowered general vitality is rarely demonstrable before the onsets. Osteoarthritis is a disease of middle or late life and is no respecter of sexes or of social standing. Proliferative changes occur at the joint margins. These are called Heberden's nodes in the fingers, and *malum coxae senilis* in the hip. An inflammatory process is not often suggested, but there is some evidence to support the etiological theory

of faulty body chemistry. The general health of osteoarthritis is excellent. Removal of surgical foci here has not in the experience of the lecturer favourably influenced the joint condition, unless these foci were profoundly affecting the general health of the patient.

In our treatment the blood supply of the joint should be maintained and stimulated by heat and massage, as also by active, painless motion—not by manipulation. The joints, excepting those in the spine and pelvis, do not ankylose, hence complete immobilization need not be feared. The weight-bearing mechanism should be made as perfect as possible. This may mean the relief of knee strain by the correction of pronated feet, the relief of low back and hip strain by the adequate support of a pendulous abdomen, the neutralization of dorsal and shoulder-girdle and cervical strain by suitable braces. Any faulty underlying biochemical cause of the joint condition should be adequately treated. In general a low meat and sweet and a low acid-forming diet is best, as in gout. Endocrine disturbances are not common in this type. Loose bodies and knee-joint fringes may be removed, but only after the disease has been rendered quiescent by adequate rest and protection. The operation of arthrodesis of the hip joint may be indicated in some of the extreme cases with good surgical risk; so also may the Whitman reconstruction operation. Osteoarthritis of the spine is often demonstrated by the x-rays in cases suspected of kidney, liver and other visceral lesions. Industrial insurance renders these of great importance. The spine should be protected and in the cases of low back pain and sciatica so frequently met with, a low short back brace with an abdominal supporting pad often affords great relief.

In the abstractor's opinion, Dr. Osgood shows undue severity towards the popular concept of infection as a causative agent and to the surgical removal of septic foci. Bodily mechanics may be corrected, endocrine disturbances investigated and vasomotor action altered as best they may be, but to many clinicians interested in arthritis the discovery of a well-marked focus of infection still affords the best hope of successful therapy.

In the orthopædic department of the Montreal General Hospital an occasional low sugar tolerance has been found in arthritics, but it has been impossible to demonstrate the frequency claimed by Pemberton. Diets in our experience

have proved disappointing excepting those for building up the system, and for the cure of gout and constipation. Unfortunately one seldom meets an arthritic who can be cured by increasing bowel movements.

J. A. NUTTER

#### OBSCURE PYREXIA IN ADULTS

THE MEDICAL SOCIETY OF LONDON,  
MARCH 8TH, 1925.

In opening the discussion, Sir Thomas Horder pointed out that cases of obscure pyrexia might require a series of inquiries; inquiries of a general nature, and inquiries of a special nature. The first general consideration should include the main causes of obscure pyrexia with few signs or symptoms. In most cases the essential cause was microbic, but certain metabolic or nervous causes might be involved; such, for example, as Graves' disease, or severe muscular exertion, or serum sickness. Certain exogenous foreign proteins also caused pyrexia, and there was no reason why endogenous proteins should not do the same. Fever might follow severe haemorrhage, a fact which complicated diagnosis in post-partum haemorrhage.

The nervous origin of pyrexia was important: certain conditions such as alcoholism, the morphine habit, pregnancy and a continued state of fever, were liable to cause an instability of the heat-regulating centre. Certain chronic diseases also seemed to render patients more liable to run temperatures for slight reasons.

Again, one must consider the probabilities as to whether the infection was exogenous or endogenous. In most acute pyrexias the infection was exogenous, and most of the subacute infections were endogenous, though there were striking exceptions such as coliform infections of the urinary tract. In searching for the seat of infection it was to be remembered that there were certain "silent" areas, such as bone; and that the liver, and the subphrenic and perinephric regions should also be most carefully examined. He had been impressed on several occasions with the important part played by the pleura in the production of certain obscure pyrexias: pleurisy over an aneurism might cause a very puzzling condition.

Dr. C. E. Lakin referred to instances of common diseases in an unfamiliar form, and described a case of tuberculous caries of the spine secondarily infected with streptococci and *B. coli*: this

case ran a peculiar form of pyrexia for many months. Typhoid fever also might exist without any of the agglutination reactions ordinarily found. Another common disease in an unfamiliar form was pyelitis, even a small amount of pus in the kidney being capable of causing prolonged fever.

Dr. Herbert French asked for information as to the value of agglutinating reactions in determining which of several isolated organisms was the cause of the patient's disease; secondly, as to whether methods of blood culture showed any improvement in recent years; thirdly, whether any value could be attached to finding organisms in the urine, since in any disease the kidney was supposed to help in getting rid of the offending organism in the urine. In reply, Sir Thomas Horder said that he thought that blood culture methods had not been specially improved of late years; that urine cultures from catheter specimens were of much value in diagnosis; and that as regards agglutination tests they afforded relative data to which undue weight should not be attached.

H. E. MACDERMOT

#### HALIFAX BRANCH OF THE MEDICAL SOCIETY OF NOVA SCOTIA

The meeting of February 25th was notable because of the presence of Drs. A. T. Bazin and F. H. MacKay, of Montreal, who came to Halifax to complete a series of visits to the centres in the Maritime Provinces in connection with the plan of the Canadian Medical Association for extra-mural post-graduate teaching. The plan was briefly outlined by Dr. Bazin, after which Dr. MacKay addressed the society on "Some spinal cord lesions". Using the lantern for the purpose of illustration, Dr. MacKay pointed out some of the pitfalls in diagnosis. Tumour of the cord is too often overlooked, and a diagnosis of some degenerative lesion made. Lumbar puncture may be of assistance in the differentiation, in cases in which a tumour blocks off the posterior subarachnoid space. The drop method is a very unreliable means of estimating pressure in the spinal fluid. Accurate measurements may be made by a mercury manometer, as demonstrated by the speaker. Dr. MacKay's slides showed various lesions of the cord, each of which was fully described. Dr. Bazin followed with a paper on "Infections of the biliary tract". He referred to the need for

greater knowledge of the physiology of the liver and gall bladder. He expressed the opinion that infection spreading up the duct from the duodenum was rare. Infection probably reached the gall bladder most commonly through the systemic circulation, but the possibilities of the portal circulation and the lymph stream must not be neglected. The symptomatology was reviewed, and reference was made to the assistance of the x-ray, particularly after the use of tetraiodophenol. Bile may be detected in the blood from two to four days before it appears in the urine. Hyperglycaemia is common if there be associated dysfunction of the pancreas. Treatment may be summarized as follows: (1) in chronic infections limited to the gall bladder, excise the gall bladder; (2) If there be enlargement of the liver or thickening of the duets, excise the gall bladder and drain the common duct; (3) if the common duct be obstructed by cicatricial tissue, do not remove the gall bladder. Both addresses were greatly enjoyed; and at the conclusion of the discussion in which Drs. K. A. MacKenzie, A. G. Nicholls, H. K. MacDonald, G. H. Murphy and I. G. MacDougall participated, a hearty vote of thanks was tendered the speakers.

On the tenth of March, two veteran members of the society contributed the addresses. Dr. Murdoch Chisholm related some of his reminiscences. He spoke of the need for keeping an open mind and a watchful eye, citing an instance in which a hernia which had been resistant to ordinary methods of reduction was easily reduced after the patient had been posed in a way which was indicated by a careful study of the case. Reference was made to the terrors of diphtheria in pre-antitoxin days. Old methods of medical teaching were discussed and compared with those now in vogue. Several instruments of his own devising were shown, including a uterine retractor, an empyema tube, a reinforced filiform bougie and a sheathed filiform bougie. Dr. John Stewart followed with a demonstration of a number of specimens from the collection recently presented to the Department of Surgery of Dalhousie University by Mr. Caird, of Edinburgh. Notable among the specimens was a cast of the head of one Robert Penman, on whom Syme had operated successfully after

Liston had refused to attempt operation. No anaesthetic was used, as the patient declined to take one although a very extensive dissection was necessary; and twenty-four minutes were required by even so dextrous and rapid an operator. Most of the specimens illustrated lesions of bones of various parts of the body; skulls showing syphilitic and accidental lesions; rachitic pelves; a luetic os innominatum; a tuberculous ischium and many others. All were described most interestingly. The addresses were discussed by Drs. Hogan, Murphy and Rankine, and the speakers were voted the thanks of the society.

On the twenty-fourth of March, the speaker was Dr. J. H. Allingham, of St. John, N.B. Dr. Allingham came as an extra-mural post-graduate lecturer under the Canadian Medical Association scheme. He spoke on the surgery of pulmonary tuberculosis, and illustrated his lecture with an extensive series of slides made from the x-ray plates of patients who have been under his care. He went fully into the indications for thoracoplasty and phrenicotomy, pointing out the necessity for estimating the vital capacity before undertaking the former operation. The method of identifying the phrenic nerve was described, and the frequent advantage of performing phrenicotomy as a preliminary to thoracoplasty was explained. In a large series of cases, Dr. Allingham had had a striking measure of success. In only one out of his twenty thoracoplasties did the patient fail to rally after the operation. Of the remainder a large percentage were very greatly relieved of distressing symptoms, all obtained some relief, and some were enabled to resume their occupations. In discussing the paper, Drs. H. K. MacDonald, K. A. MacKenzie and Dr. Sieniewicz complimented Dr. Allingham on the results of his operations and on his excellent presentation of his subject. The thanks of the society was tendered to Dr. Allingham by the president, Dr. Little.

W. H. HATTIE

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#### TREATMENT OF MALIGNANT DISEASE WITH LEAD\*

The address is based on the treatment and clinical results in the first 247 cases of malign-

\* An address delivered before the Glasgow Gynaecological and Obstetrical Society by W. Blair Bell, M.D.

nancy, treated by Dr. Bell and his associates, with lead. No claims are made for the treatment, for it is as yet largely in the experimental stage. Nor does Dr. Bell advise the general employment of lead, for the dangers and difficulties of the intravenous injection of colloidal lead are too many, much experimental and therapeutic work must first be done.

Various preparations of lead have been tried: lead iodide, oleate, morrhuate etc., and abandoned. Now an electrical suspension of metallic lead in an aqueous medium, with gelatin and calcium chloride, is used. The reason for using a colloidal preparation is that the lead ion is very toxic, and so must be delivered among the body tissues slowly. Malignant cells seem to have a selective attraction for the lead. It is thought that the preparation dissociates quite slowly in the blood stream. Intravenous administration is preferred, because then it is known that the drug is taken up by the tissues and excreted. Patients with large tumors are less subject to injurious effects from lead, than patients whose growth, in proportion to body weight is small. The fatal amount of lead given in a single dose is a little over 0.2 grams. In seven or eight doses scattered over a period of four months time, it is possible to give three times this amount without any serious ultimate consequences. Sometimes in superficial growths, the solution of lead may be injected directly into the mass, diminishing both pain and the local growth.

Contraindications to this treatment are not many. The general condition of the patient is of primary importance. Chronic nephritis, and jaundice, caused by pressure on the common bile-duct and causing a lesion of the liver, and severe cachexia, all render extensive treatment dangerous. Secondary involvement of the lung or brain may be a contraindication. The large size of the growth does not contraindicate treatment. If the tumor has a good blood supply and is not larger than five per cent of the body weight, some hope may be given. At times it is found necessary to combine surgery and radiation. Lead is quantitative in its action, hence as much of the growth as can be, is removed before starting the lead treatment.

Of the cases reported, seventy died before treatment could be completed: 106 died after treatment, two of these from acute nephritis. In ten cases, the disease was completely arrested, and thirty-one others are believed to be cured. As an example of a successful case—"a woman,

thirty-four years of age, with malignancy of the rectum, was first operated on. The rectum was removed and the sigmoid brought down to the anal orifice, but a large mass of growth was left in the pelvis. Subsequently she was given .265 grams of lead. She is now well, has gained weight, and shows no evidence of malignancy."

Dr. Bell concluded his address by saying that there is no doubt that lead has a specific action on malignant cells if it can only reach the cells in sufficient quantity. But he realizes that the method is by no means perfect, in fact is "only a substitute for something better."

ELEANOR PERCIVAL

## Abstracts from Current Literature

### MEDICINE

**Prevention of Goitre.** Wheatley, Jas., *Jour. of Roy. Inst.*, December, 1925, xlvi, No. 7.

It is now well established that goitre of the endemic, sporadic or epidemic form, is a deficiency disease. In brief the evidence for this lies in the following facts (1) that iodine is an essential component of the thyroid, and goitre appears when the iodine content of the gland falls below a certain point. (2) It can be experimentally produced. (3) It has been abundantly proved that there is a deficiency of iodine in soil, water and vegetation of those areas in which goitre commonly occurs. (4) Both the prevention and treatment of goitre has been carried out on a large scale in goitrous areas, by the administration of iodine. That there are subsidiary factors is well recognized, such, for instance, as those interfering with absorption and utilization of the iodine, and increased demands for thyroid secretion, but these are secondary.

A sufficient consumption of iodine is then necessary, either in food or by artificial methods. Three methods have been in use for giving iodine to the public—by adding it to the water supply, by iodized tablets or chocolates for school children, and by adding it to table salt.

Addition to the water supply not only leaves out those outside of the public water system but demands a minimum daily consumption of water which cannot be depended on in every case. School children are very conveniently reached by the tablet method, but this leaves the adults unprovided for.

Dr. Wheatley thinks that the addition of iodine to table salt is the most convenient and

satisfactory method. He shows, however, that extraordinary differences in opinion exist as to the amount which should be added. As much as 4-8 grains of sodium iodide have been safely given to a large series of children over a period of two years, and on the other hand so small an amount as 1/320 part of this has proved efficacious in preventing goitre. His own conclusion is that one part of potassium iodide to 100,000 of salt is sufficient, assuming that 5 kilograms of salt per year is consumed.

He thinks that legislation should be invoked to prevent the sale of iodine-free salt in certain areas, or else to approve salts with a definite iodine content for sale. The minimum efficient amount of iodine should be closely investigated.

H. E. MACDERMOT

**Cerebral Symptoms Induced by Anglo-Neurotic Oedema.** Kennedy, F., *Arch. of Neurol. & Psych.*, Jan., 1926, vol. xv.

Dr. Kennedy would have us become accustomed to thinking of definitely circumscribed areas of oedema in the brain, occurring quite apart from the more familiar condition of "wet brain". It is not easy to produce specimens or visible proof of such localized oedema in this region, but he is quite satisfied from his own observations that it does exist, in view of the acute transient oedemas of the optic nerve and retina that may be actually watched, coincident with certain phenomena in other parts of the nervous system, the medulla, the auditory nerves, the internal capsule, which can be completely explained as being caused by the same kind of oedema.

He reminds us of the definite types of people who may exhibit angio-neurotic oedema, those who may have an occasional anaphylactic

seizure due to some accidental toxic cause, and those who may have these crises repeatedly as a result of food or other toxic factors. With these types in mind it is not surprising to find angio-neurotic manifestations occurring in the central nervous system, however hard it may be to demonstrate them to the eye or ear. Notes are given of three cases in which the evidence of such conditions on the central nervous system is very clear.

In all three cases there were definite attacks of giant urticaria involving various parts of the body, and in two it was found that there was a sensitiveness to food (milk in one case and milk and veal in the other). The first case was a child of two, who had attacks of severe pain in the head and convulsive seizures associated with severe generalized attacks of urticaria, either preceding or following the cranial symptoms. Sedatives were of little use, but there was some relief with belladonna and epinephrin. With the discontinuance of milk she had no more attacks, and has remained free for seventeen months.

In the second case no susceptibility to food could be established, but the patient suffered from attacks of typical angio-neurotic edema involving the face and soft palate and arms. In one year the patient had four attacks of hemiplegia, coincident with urticaria, and in no instance did the cerebral symptoms last more than thirty-six hours.

The third patient had had attacks of edema involving the joints for some five years, and along with these, later on, headache and loss of vision along with the swellings. Between attacks he could see perfectly well. In one attack he had headache, loss of vision, stupor and left-sided hemiplegia. In another there was complete aphonia and deafness, with palatal paralysis, laboured respiration and incontinence of urine and faeces. It was possible during these various attacks to watch the retina and to note gradual increase or decrease of an acute oedematous condition. Recovery was gradual and with fluctuations: the hemiplegia only improved moderately, and Dr. Kennedy suggests that the oedema may have been so severe as to cause structural damage. The patient had had asthma in childhood and there was a family history of urticaria in the mother.

H. E. MACDERMOT

**The Concentration of the Blood and of the Urine in the Diabetic Toxæmia.** Bulger, H. A., and Peters, J.P., *Arch. Int. Med.*, December, 1925.

A striking dehydration of the blood has been a prominent feature in all cases of severe diabetic toxæmia. This dehydration is indicated by the high initial concentration of haemoglobin and of cells in the blood and of protein in the plasma. These changes appear to be due to a decrease of water in the blood rather than to an absolute increase in the blood elements affected. The cause of this concentration does not appear to be related to a diminution in fluid intake. Alterations in blood hydration are not related to the level of the blood sugar. Hyperglycæmia may persist or even increase as the blood becomes diluted. Blood dilution was associated with an increase in plasma carbon dioxide but anhydremia was found where there was little or no acidosis.

Dehydration of the blood was associated with the production of urine containing remarkably low concentrations of nitrogen and sodium chloride. Apparently there is a definite failure to eliminate nitrogen. Following treatment there was an increase in the rate of urine excretion and a striking increase in the rate of nitrogen elimination.

Some cases on admission showed low urine glucose and high blood sugar. Under treatment the urine glucose increased while the blood sugar fell. The authors confirm Joslin's observation that urinary sugar may decrease as coma advances. The urinary phosphate concentration was relatively high on admission and fell rapidly with treatment.

Disturbance of renal function may be due to an increase of osmotic resistance due to an increase of plasma colloids or may be due to some disturbance of renal circulation or due to the alterations in general of tissue metabolism. Structural damage of the kidney is not likely because of the rapid recovery of function that follows well-directed therapy.

These studies have emphasized certain important considerations in treatment. They not only indicate clearly the importance of giving large amounts of fluids but also the urgent need of combating the toxic destruction of protein. These considerations are all the more important in cases complicated by infection in which

there is additional protein destruction, and in cases complicated with kidney disease in which there is a greater tendency for nitrogen retention.

LILLIAN A. CHASE

**The Effect of Liver Damage on Cholecystography in Dogs by the Use of Sodium Tetra-Iodophenolphthalein.** Fried, B. M., and Whitaker, L. R., *Arch. Int. Med.*, March, 1926.

The purpose of the authors' present study was (1) to determine the toxicity of sodium tetra-iodophenolphthalein in dogs in which the liver was damaged by the use of chloroform as an anæsthetic, and (2) the degree of excretion of the drug by a liver thus damaged as determined by cholecystography.

They reminded us that the visualization of the gall bladder for diagnostic purposes was made possible through the observation of Abel and Rowntree that halogen compounds of phenolphthalein are excreted almost wholly by the liver.

It remained for Graham and Cole to be the first to apply this principle to cholecystography. They experimented with intravenous injections of tetra-iodophenolphthalein and later with tetra-bromphenolphthalein. By using these substances the gall bladder could be rendered opaque to roentgen rays, and therefore visible. Theoretically the visualization of the gall bladder by these drugs is based on the power of this organ to concentrate substances excreted by the liver in bile.

It has been found that a fairly good shadow of the gall bladder could be obtained by the oral administration of the drug in "enteric" coated pills. At the Peter Bent Brigham Hospital, Boston, one or other of the above methods has been utilized in 200 cases with very good results. In twenty-eight patients upon whom operations were performed this method of diagnosis proved to be correct in 93 per cent.

From their first series of experiments on dogs they concluded that (1) cholecystography with sodium tetra-iodophenolphthalein in dogs in which the liver lobule is extensively damaged by chloroform (fatty degeneration, central necrosis) is negative.

(2) Dogs in which the liver shows a central necrosis occupying more than one half the lobule, as a rule tolerate the drug fairly well.

(3) Starvation for three days, followed by

the administration of small amounts of chloroform over one-half hour leads to an extensive damage of the liver.

From their second series of experiments they concluded that an extensive lesion of the liver interferes with its excretory function and consequently with cholecystography, but that a moderately damaged liver does not interfere with cholecystography in dogs by the use of sodium tetra-iodophenolphthalein.

In their third series of experiments, the dogs were not starved, but otherwise treated in a similar manner to those in experiments one and two. In all animals, clear shadows of the gall bladder were obtained. This seemed to indicate that starvation was apparently one of the primordial factors in the production of liver damage by the use of chloroform.

The writers, in conclusion, feel that because of the much smaller amount of sodium tetra-iodophenolphthalein routinely used in patients, than used with safety on dogs known to have more or less extensive hepatic damage, the existence of presumed or obvious hepatic disease in human beings should not necessarily preclude the employment of the drug for purposes of cholecystography in the hospital wards or clinics.

L. C. MONTGOMERY

## SURGERY

**Persistent and Recurrent Hyperthyroidism.**

Lahey, Frank H., and Clute H. M., *Ann. of Surg.*, Feb., 1926.

This report is based on forty-eight cases but the conclusions are based on twenty-four cases of primary hyperthyroidism who have returned for further treatment, and whose history is accurately known. These cases fell into two groups, first, those whose metabolism never came to normal following their first series of operations although they improved clinically. There were nineteen in this group. Secondly, those who were normal clinically and had normal metabolic readings but returned later with recurrence of their disease. There were five in this class. The first group have persistent, the latter recurrent hyperthyroidism.

The nineteen patients of the first group had on their original admission a metabolic rate of plus 75, and all had multiple stage operations, which reduced their average rate to plus 34. On admission from one to one and a half years

later, their average rate was plus 45, which after a second operation was reduced to plus 28 per cent. Some were operated on a third time. The basal metabolic rate for the entire group now averages plus 14. Two of these are slightly toxic.

Many cases were improved on Lugol's solution but this was not permanent. The study of these cases shows that failure of the rate to return to normal after two or three months is due to too much hyperplastic tissue in the neck, and that if the condition persists after eight to twelve months re-operation is advisable.

In the second or recurrent group the interval of freedom from symptoms averaged two years. Four of these five patients had taken Lugol's solution for months after the recurrence, but in none was there marked improvement. In all the forty-eight cases re-operated upon the authors have never failed to find a good-sized piece of thyroid tissue. In four cases there was definite hypertrophy of the gland and large new lobes had been formed. In cases once operated upon it is difficult to judge the size of the thyroid remnant. Re-operation has not led to recurrent laryngeal paralysis or tetany.

The secondary operation is very difficult. The pre-thyroid muscles must be separated from the gland by clipping with scissors. The carotid artery and jugular vein must be isolated and retracted, and when this is done no difficulty will be found in delivering the remnant of gland.

R. V. B. SHIER

**Traumatic Rupture of the Kidney.** Wesson, Miley B., *Ann. of Surg.*, February, 1926.

Rupture of the kidney is more common than is generally supposed, and since the advent of workmen's compensation insurance it assumes a place of particular importance. In considering the etiology the author points out how frequently the causative factor is a trivial blow or squeeze. The commonest modes of injury are (1) a blow driving the kidney against the lower ribs or transverse processes of the first and second lumbar vertebrae, (2) concussion, (3) abrupt flexion of the body. Infection plays a part in spontaneous rupture but not in traumatic.

Pathologically classified, kidney ruptures are divided into three classes: (1) ecchymosis, (2) subcapsular rupture, and (3) complete rupture.

The subcapsular is benign, but the complete rupture is serious owing to extravasation of blood and urine. The right kidney is more often affected than the left. Hemorrhage as a symptom may be (1) as hematuria, (2) perirenal, (3) intra-renal, (4) intraperitoneal.

The usual train of events is a fall, a sick feeling, hematuria, dysuria, and shock. Hematuria is present in 90 to 95 per cent. The shock if coming on several hours later is due to hemorrhage, but if immediate is due to solar plexus injury. There is no kidney pain in rupture unless there is intrapelvic back pressure. This is due to the nerve supply being in the pelvis and not in the cortex.

The treatment is along one of four lines: (1) Expectant, for cases where hematuria is the only symptom; (2) conservative surgery, that is, tampon and suture for a damaged kidney; (3) nephrectomy, for a completely destroyed kidney; (4) abdominal incision for a torn peritoneum.

The indications for exploration are (1) immediate severe renal hemorrhage, (2) steady rise in pulse rate, (3) anemia due to continuous hemorrhage. The indications for nephrectomy are (1) tearing of renal pedicle, (2) multiple lacerations of the kidney, (3) a tear extending toward the renal pelvis in a kidney unable to be delivered for satisfactory suture, (4) a very extensive tear involving the ureter, (5) hydronephrosis or other kidney disease.

The author remarks in conclusion that "more lives might have been saved by timely operations," and that "nephrectomy could have been avoided if hematuria and history of fall had not been considered the indication for operation."

R. V. B. SHIER

**The Etiology of the Post-Operative Pulmonary Abscess.** Holman, E., *Ann. of Surg.*, February, 1926, p. 240.

Experimentally it has been found impossible to produce a pulmonary abscess by the introduction of septic material into a bronchus. It can be produced with comparative ease, however, by the introduction of infected emboli into the jugular vein. In the one case the intact blood supply forms a protective barrier against the invading agent, and in the other there are septic infarction, interruption of blood supply and breaking down of tissue.

Symptoms of pulmonary abscess commence from the sixth to the ninth day after operation. If the cause were aspiration it would be reasonable to expect the symptoms to appear at once, that is, as soon as the aspiration took place. The average time before the appearance of symptoms is the same after operations done under local as under general anaesthesia.

The greatest incidence of the simpler pulmonary complications such as transient fever, tachypnoea and broncho-pneumonia, is found in operations on the upper abdomen, where emboli are likely to be dislodged by the constant movements of the parts from respiration. The least incidence is in operations on the scalp and cranium where the parts are rigid and immobile. As to pulmonary abscess following tonsillectomy and other operations about the mouth, it must be remembered that there is always more or less sloughing and there is constant movement of the muscles of the throat and neck. The first factor favours septic thrombosis in the vessels and the second dislodgement of infected emboli.

W. B. HOWELL

**The Effect of the Sympathetic Nervous System on the Peripheral Vascular System.** An Experimental Study. Masser, W. B., and Taylor, K. P. A., *Arch. Surg.*, March, 1926, xii, No. 3.

The work is essentially a study of the effect of periarterial sympathectomy, the writers pointing out that actually very little is known about the sympathetic supply to arteries. Experiments were performed on cats and dogs. Periarterial sympathectomy was carried out on the femoral artery, and control incisions isolating the artery, without sympathectomy, were performed on the opposite leg in a certain number of cases. The changes in temperature of the foot of the leg operated on, were used as a criterion of results.

The first conclusion arrived at was that in dogs and cats periarterial sympathectomy does not produce hyperthermia; in other words that vasomotor impulses must have an extravascular course.

An attempt was made to block off these impulses in the sciatic nerve by injecting it with alcohol. This work showed that (1) alcoholic injection of the sciatic nerve in sufficient strength to cause motor paralysis produces

hyperthermia. (2) The hyperthermia declines approximately in proportion to the motor recovery. (3) The combination of alcoholic injection of the sciatic nerve with femoral sympathectomy produces a slightly more marked hyperthermia. The minimum concentration of alcohol necessary to produce paralysis produces a maximum hyperthermia.

The final conclusion would appear to be that vasomotor impulses travel mainly by the path of the spinal nerves, the remainder, being a small percentage only, travel by the periarterial sympathetic. The substitution of injection of nerves for sympathectomy suggests interesting clinical possibilities.

L. H. MCKIM

**The Treatment of Severe and Persistent Uterine**

**Hæmorrhage by Radium.** Forsdike, Sidney, *Brit. Med. Jour.*, March 13, 1926.

The author presents the effect of radium in stopping severe uterine haemorrhages in 200 cases. Only cases which were refractory to drugs or curettage are included in the series.

The condition, spoken of either as chronic metritis, chronic subinvolution or fibrosis uteri, occurs most commonly at the menopause, at puberty and between the ages of thirty and forty years. The one distinctive feature of all cases is profuse bleeding.

Pathologically two types of uterus are seen—one called the systolic, the other the diastolic uterus. In the former there is little, if any enlargement, and practically no tissue is obtained on curettage. In the diastolic type, the uterus is large and boggy, and is often retroverted. Abundant hyperplastic endometrium is obtained on curettage. This type occurs nearly always near the menopause and the hyperplasia soon recurs with recurrence of symptoms, after curettage.

The technique of the treatment is as follows: A diagnostic curettage with microscopic examination of the tissue obtained, is always done to exclude malignancy. The radium salt, screened in brass and rubber to exclude all but the gamma rays, is inserted into the uterus, and the vagina is packed with gauze to hold the radium in place. The dose varies with the age of the patient, and whether one is desirous or not of producing a permanent or a temporary amenorrhea. In almost all cases one exposure was sufficient to establish a permanent

menopause—those which were refractory to one treatment occurred among the young women. The only symptoms caused by the treatment are nausea while the radium is in place, and a watery discharge for a few weeks afterwards. If the treatment is done a few days before a period is expected, this period is apt to be profuse and the patient should be kept quiet.

The only contraindication to radium is pelvic inflammatory disease. ELEANOR PERCIVAL

### PÆDIATRICS

**Hexylresorcinol in the Treatment of Pyelitis of Infancy and of Childhood.** Scott, W. J., and Leonard, V., *Amer. Jour. Dis. Chil.*, February, 1926, vol. xxxi, No. 2.

The experimental facts which are the basis for the clinical employment of hexylresorcinol in the treatment of pyelitis are, (1) it is a chemical compound, (2) it is non-toxic in therapeutic doses, (3) it is non-irritating to the urinary tract, (4) it is bactericidal in high dilution in urine of any reaction, and (5) it is eliminated by the kidney after administration by mouth, unchanged, in sufficient concentration to impart active bactericidal properties to the urine.

The soluble gelatine capsule devised for adults is too large for small children to take, so a 2.5 per cent solution of the drug in olive oil is advised. It can be given without any relation to feedings, is well borne and is apparently as efficacious as the more concentrated solutions. Treatment is begun with teaspoonful doses, three times a day, gradually increasing to two or three teaspoonfuls three times a day, depending on the case. There may be a slight catharsis at the beginning of the administration of the drug, but this disappears. As a rule children tolerate relatively larger doses of the drug than adults. The use of the drug should not be combined with an increased fluid intake nor with alkalis, though the courses of the two forms of treatment may be alternated. In the treatment of chronic *B. coli* infections of the urinary tract in children, as in adults, a long course of treatment should be given, at least over a period of weeks.

Included in the article are case reports of twelve children with pyuria who were cured by this treatment. The author notes a striking improvement in the general health and

nutrition frequently observed in children taking hexylresorcinol, which does not seem to be entirely dependent on the control of the urinary infection, for it may occur long before there is any noticeable improvement in the local condition and is sometimes the most impressive effect of the treatment.

R. R. STRUTHERS

**Fasting as a Cause of Convulsions.** Josephs, Hugh, *Amer. Jour. Dis. Child.*, February, 1926, vol. xxxi, No. 2.

In 1924 the author reported with S. G. Ross a case of a child who suffered convulsions at the onset of acute infections, accompanied by vomiting, and in one instance, a very marked lowering of the blood sugar. Since then he has noted that certain children have convulsions in the early morning, after a short fasting period of ten to twelve hours, and now reports a number of such cases, in three of whom the blood sugar was estimated following the convulsions and found to be markedly lowered. In comparison with normal children he notes that not only does the blood sugar concentration fall more rapidly, but that the final concentration is lower.

In some cases vomiting was a marked feature, so much so that they were classified as "recurrent vomiting". Others have also reported cases of recurrent vomiting associated with convulsions. Josephs suggests that the attacks of recurrent vomiting and the convulsions described in this paper are both manifestations of the same condition, namely hypoglycæmia.

Fever was present in most of the cases reported. This may account for the short period of fasting, causing anorexia, producing a lowered blood sugar. Fever may together with a short fast have the effect of producing an attack, when simple fasting for the same length of time merely causes a lowering of the blood sugar. Fever may either have an effect on the metabolism by diminishing mobilization of carbohydrate, or as seems quite probable, by increasing the rate at which the available carbohydrate is used up, or else it may merely render the child's nervous system more unstable so that a lowered concentration of sugar in the blood, which under ordinary conditions causes no disturbance, would cause convulsions at a higher temperature.

The treatment used in the cases reported was administration of glucose solutions by rectum or by mouth, in small quantities frequently repeated.

R. R. STRUTHERS

### ANÆSTHESIA

#### Apnoea, Dyspnoea and Cyanosis in Relation to Anæsthesia.

Pembrey, M. S., and Shipway, F. E., *Guy's Hospital Reports*, January, 1926, vol. lxxvi, p. 53.

The inhalation of air containing more than 2 per cent of carbon dioxide abolishes apnoea by maintaining the tension of that gas in the alveolar air and the blood, at its stimulating value. The administration of pure oxygen, by means of a mask and valves, abolishes apnoea by maintaining the partial pressure of carbonic acid in the blood; the respiratory centre is no longer excited by lack of oxygen to send out the forcible impulses which had previously resulted in excessive ventilation, whereby carbon dioxide was washed out of the alveoli and the blood. Air containing a smaller percentage of oxygen than that present in atmospheric air abolishes apnoea because the constant deficiency of oxygen stimulates the respiratory centre.

A frequent cause of apnoea during anaesthesia is the instruction given to the patient to "breathe

deeply". Deep breathing washes out too much carbon dioxide, and disturbs the natural ventilation of the lungs. Apnoea may be due to intratracheal insufflation if the ventilation is excessive, and CO<sub>2</sub> is washed out of the lungs and blood. Thirty litres of air a minute have produced apnoea lasting two minutes.

Excessive pressure of CO<sub>2</sub> leads to sweating, flushing, hurried breathing and a falling pulse rate, while the blood pressure rises at first but falls later; a deficient pressure produces pallor, a cold clammy skin, feeble breathing and a quickening pulse rate.

As the partial pressure of CO<sub>2</sub> is diminished the haemoglobin holds on more tightly to the oxygen. Thus a condition may arise in which, although the blood is completely oxygenated, the patient may be suffering from anoxæmia.

Apnoea seldom, if ever, arises during the administration of ether by the open method, as this method is in reality a semi-open one.

Hyperpnoea and dyspnoea are quickly produced by an excess of CO<sub>2</sub>, which may arise from rebreathing or some obstruction in the air way; in the latter case there is also a lack of oxygen. Excitement and struggling during induction are often asphyxial in origin and can be prevented for the most part by the free use of oxygen.

W. B. HOWELL

#### Lumbar Puncture and Prevention of Post-Puncture Headache.

—Experiments and experience have convinced H. M. Greene, Portland, Ore., that postpuncture headache is caused by trauma to the spinal dura sufficient to result in excessive leakage of cerebrospinal fluid to the point at which the brain is left without a water cushion. The experiments demonstrated that a greater trauma was produced by the use of a needle with a blunt cutting point than by a needle of the same caliper with a point rounded, tapering and sharp. It was also shown that leakage followed puncture of the spinal dura in every instance in which the membrane was suspended and filled with water, and that the amount of leakage was in direct relation to the size of the needle used. The details and methods employed by Greene in this operation are as follows:

1. The patient should be placed on a table in a comfortable position and should remain motionless while the needle is in the dural sac. 2. A local anæsthetic should be used in both the skin and the deeper tissues. 3. A needle with a point that is round, tapering and sharp should be used. The needle should be sharpened so as to resemble an ordinary eameric needle and should be polished each time before it is used. Gage 22 is the most suitable, but a needle one or two sizes larger may be used with good results. 4. After the fluid appears in the hub of the needle it is advisable to aspirate the sample with caution. Two hundred and fifteen consecutive punctures have been done by Greene with a headache incidence of two in the series. The punctures were nearly all done in the office, and the patient was allowed to go home and lie down.—*Journal American Medical Association*, Feb. 6, 1926.

## Association Notes

### PRELIMINARY PROGRAMME FOR THE FIFTY-SEVENTH ANNUAL MEETING OF THE CANADIAN MEDICAL ASSOCIATION, JUNE 21, 22, 23, 24, 25, 1926.

HEADQUARTERS—EMPRESS HOTEL, VICTORIA, B.C.

#### Monday, June 21st

10:00 a.m.—Meeting of Council, which, with adjournment for luncheon and dinner, will continue throughout the day.

#### Tuesday, June 22nd

9:30 a.m.—Meeting of Council.

10:30 a.m.—Official opening of commercial exhibit, following which, Council will reconvene, and, with adjournment for luncheon and dinner, continue throughout the day.

#### Wednesday, June 23rd

9:00 a.m.—Registration

10:00 a.m.—Official opening by the President, President-Elect and representatives of our British Columbia and Victoria hosts.

11:00 a.m.—Symposium, Duodenal Ulcer—Dr. H. C. Moffitt, San Francisco. Dr. W. H. Dickson, Toronto. Dr. F. N. G. Starr, Toronto.

1:30 p.m.—Injuries to the Elbow in Children—Dr. L. J. Austin, Kingston.

High blood pressure from the standpoint of the general practitioner—Dr. C. F. Martin, Montreal.

Chronic mastitis—Dr. A. J. Grant, London.

Progress in our knowledge of kidney and liver function in relation to disease—Dr. L. G. Rowntree, Mayo Clinic.

Surgical aspects of acute abdominal disease—Dr. Edgar Allin, Edmonton.

Encephalitis lethargica—Dr. Chas. Hunter, Winnipeg.

Empyema—Dr. J. G. MacDougall, Halifax.

#### Thursday, June 24th

9:00 a.m.—The etiology, diagnosis, prevention and treatment of scarlet fever—Dr. J. G. Fitzgerald, Toronto.

Acute arthritis—Dr. Alex. Gibson, Winnipeg.

Some general diseases which have origin in infections of the head—Dr. J. F. Barnhill, Indianapolis, U.S.A.

The causes and treatment of convulsions in infants and children—Dr. S. G. Chown, Winnipeg.

Some phases of heart disease with special reference to the needs of the general practitioner—Dr. J. C. Meakins, Montreal.

The cancer problem—Dr. Jas. Miller, Kingston.

The non-relation of malnutrition to the incidence of infectious diseases—Dr. H. W. Hill, Vancouver.

#### Annual Meeting of CANADIAN MEDICAL PROTECTIVE ASSOCIATION

1:30 p.m.—Co-operative diagnosis and treatment between the physician and consultant—Dr. W. S. Lemon, Mayo Clinic.

Maternal mortality—Dr. Helen MacMurchy, Ottawa.

The Sir William Osler Memorial Volume and its classified and annotated bibliographies (lantern slide exhibits)—Dr. Maude E. Abbott, Montreal.

Paralytic deformities of Childhood—Dr. J. A. Nutter, Montreal.

**Friday, June 25th**

9:00 a.m.—Symposium—Goitre—Dr. W. D. Keith, Vancouver. Dr. A. H. Gordon, Montreal.  
Dr. G. S. Fahrni, Winnipeg. Dr. W. H. McGuffin, Calgary.

The toxæmias of Pregnancy—Dr. W. B. Hendry, Toronto.

Recent advances in the physiology of the parathyroid glands—Dr. J. B. Collip, Edmonton.

1:30 p.m.—Medical research—Dr. F. G. Banting, Toronto.

The newer drugs, their uses and abuses—Dr. V. E. Henderson, Toronto.

The problem of the acute ear—Dr. Ritchie Rodger, Hull, England.

Tumours—Dr. J. O. Thompson, Canton, China.

Pernicious anaemia—Dr. Duncan Graham, Toronto.

Prevention, diagnosis and treatment of post-operative peritonitis—Dr. J. S. McEachern  
Calgary.

**ENTERTAINMENTS**

The Programme of Entertainment as arranged for the Annual Meeting of the Canadian Medical Association in Victoria is now completed and all members of the Association are assured of a warm welcome and a pleasant and well occupied week. It is hoped that there will be a large attendance of ladies for whose special entertainment many plans have been made. A Committee of Ladies will be in attendance every day in the Ladies Reception Room in the Empress Hotel to give information, and to assist all in making their plans regarding where to go, what to see, and how to accomplish what they wish to do.

On Monday at noon members of the Council will be the luncheon guests of Dr. Forrest Leeder, the President-Elect.

On Tuesday afternoon Lady Barnard will hold a reception in her beautiful gardens.

On Wednesday after luncheon a drive will be offered to all the ladies to see the points of interest in the immediate environs of Victoria. The drive will commence at 2 p.m. and will end at "Stoneyhurst," the home of Mrs Forrest Leeder, on Rockland Avenue, where a reception will be held and it is hoped that the ladies here may meet one another and become acquainted.

Arrangements have been made for bridge and mah jong parties in the evening while the men will be occupied at the annual dinners of the British Columbia Association on Tuesday night and of the Canadian Medical Association on Wednesday night.

A visit to the Parliament Buildings and afterwards to the observatory on Saanich Mountain is planned for Wednesday.

The Ladies Golf Committee has arranged for those who desire to play. The Oak Bay Links, the Colwood Course, the Uplands Golf Club, the Esquimalt Course and the Cedar Hill Course have all offered full privileges to visitors who wear the C. M. A. badges or buttons. The several tennis courts are in good order, and games will be arranged for those who wish to play. Those who may desire to ride can obtain horses. For those who enjoy swimming, arrangements have been made for a plunge at Crystal Gardens where the warm salt water pool is very popular, or at Brentwood where the water is almost as warm. For those who prefer fresh water, privileges at Elk Lake are offered. For ladies who may wish to bowl, opportunity is also offered.

On Thursday afternoon promptly at three o'clock the scientific programme will stop and everyone is invited to visit the Sunken Gardens at Mr. Butchart's residence on Tod Inlet. The visit here will be followed by tea at Brentwood College where all visitors connected with the Association will be the guests of the Governors.

In the evening the Lieutenant-Governor will give a Reception in honour of the members of the Canadian Medical Association at which there will be music and dancing.

An alternate attraction for Thursday afternoon will be a drive over the famous Malahat road from which can be seen some of the wonder spots of Vancouver Island. The road circuits and climbs a mountain from which one looks down on the Saanich Inlet and Brentwood. Dr. Chester Brown has suggested the Quarantine Station as a place to visit and it will require only a hint to find oneself transported to his hospitality.

The Rose Show is being arranged by the Local Rose Club; Victoria is second to no other city in rose culture. Simply provide for your registration as a visitor to the Rose Gardens and the enthusiasts will visit.

The ladies who are not too tired are to be offered a choice of many things to do on Friday morning and early afternoon.

The afternoon event for the ladies will be the Garden Party at Hatley Park, the country seat of Mrs. James Dunsmuir, and this should be planned for by one and all.

The men will dine as college units on Friday evening, but the ladies—God bless them—are also planning a dinner—so Victoria can safely wind up its programme with the old song—old but so expressive—"There'll be a hot time in the old town to-night."

#### ALUMNI DINNERS—FRIDAY EVENING, JUNE 25TH

##### **Manitoba University**

The Manitobans of Victoria have arranged to hold their dinner in the Empress Hotel. The attendance is expected to be large with representatives from graduating classes over a long period of years. This will be essentially a get-together dinner and should be a very enjoyable affair.

##### **McGill University**

The local graduates have made arrangements for this dinner to be held in the Empress Hotel. Many distinguished graduates are coming, including, Dr. A. H. Gordon, Dr. C. F. Martin, and several other members of the Teaching Staff.

From present indications there will be a large attendance of McGill men at the General Meeting and at this Alumni Dinner.

##### **University of Toronto**

The Torontonians of Victoria have arranged to hold their dinner in the Union Club and already many have signified their intention of being present. It is expected that not only will there be visitors from every province and most of the Western States, but that every class for the past thirty-five years will be represented. Toronto Alumni are assured a good time, so plan to meet your friends and classmates at the Dinner.

##### **University of Western Ontario**

Dr. Walter Bapty is the Victoria representative of the Alumni of this University and urges upon its graduates the desirability of attending the Association meeting and the Alumni Dinner.

#### TRANSPORTATION

Previous issues of the Journal carried an intimation that if one hundred or more members desired to travel to the Victoria meeting by special train, such accommodation could be secured.

As less than thirty have expressed their willingness to travel by special train and as in this number there is considerable diversity of opinion as to the routes to be taken, all idea of a special train to Victoria is now abandoned. Many members who are going to the meeting, however, particularly from Eastern Canada, are urged to make their reservations soon, as indications point to heavy railway traffic about the time of our Convention.

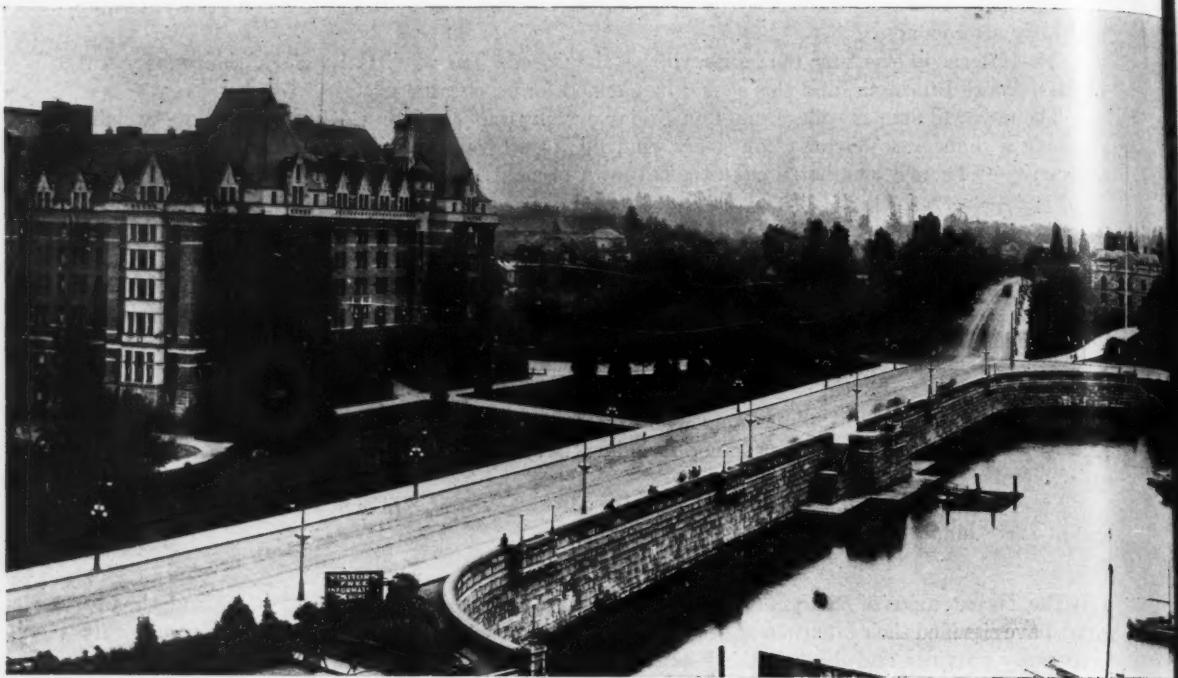
Depending upon the distance to be travelled, summer tourist fares are cheaper than fare and one-half, such as may be secured by convention certificates, and in addition they allow stop over privileges until October. In purchasing your transportation the local agent will be able to afford you all information. All those travelling to the meeting are urged to obtain a standard certificate irrespective as to whether they are travelling on the summer tourist plan or a one way ticket. These certificates will be of no use to the summer tourist plan traveller but will assist in showing the travelling attendance and securing the half rate return fare we are planning for those who travel on that plan.

Any further information, which may be required by any member, will be cheerfully furnished by either the General Secretary of the Association or by the Local Secretary, Dr. M. W. Thomas, 1207 Douglas Avenue, Victoria.

#### HOTEL RESERVATIONS

Hotel reservations should be secured promptly.

The Ladies Committee requests that in making reservations members shall state the number of ladies accompanying in order that provision may be made for their personal reception and entertainment. Write or wire Dr. Gordon C. Kenning, 1207 Douglas Street, Victoria.



PANORAMA OF THE INNER HARBOUR AND PARLIAMENT BUILDINGS

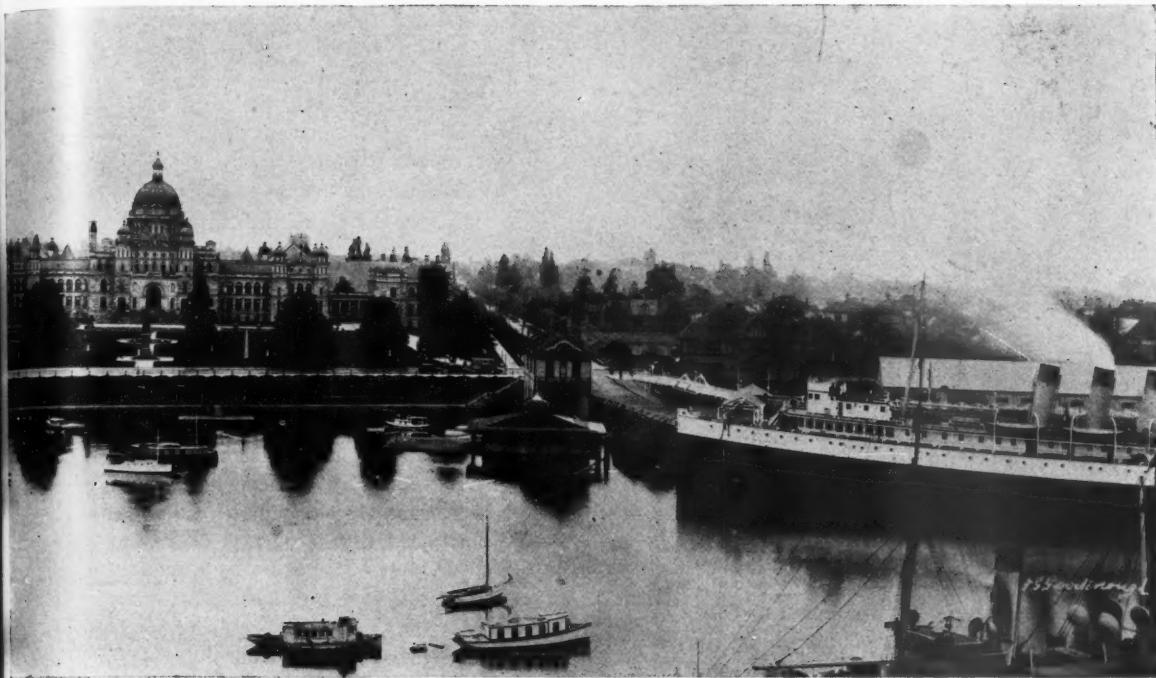
### THE CONVENTION CITY

VICTORIA, the capital city of British Columbia, with a population including the adjoining Municipalities of Oak Bay, Saanich and Esquimalt, of 60,000, is situated on the southeastern end of Vancouver Island. The City is sea-girt on the South and East so that its inhabitants have always the breath of the Pacific Ocean in their nostrils, while away to the West and North stretch farming and rural settlements gradually merging into the famous virgin forests of Vancouver Island.

To those who love and prize the urban life with all the social amenities that one looks for and expects in the modern residential city, Victoria makes a special appeal. The streets, paved and boulevarded, are shaded by avenues of evergreen trees; the established public utilities are ample for a population of 200,000, while the pure mountain lake water supply is sufficient for half a million people. In-



EMPRESS HOTEL, VICTORIA, B.C.  
Headquarters of Canadian Medical Association, June 21-25, 1926



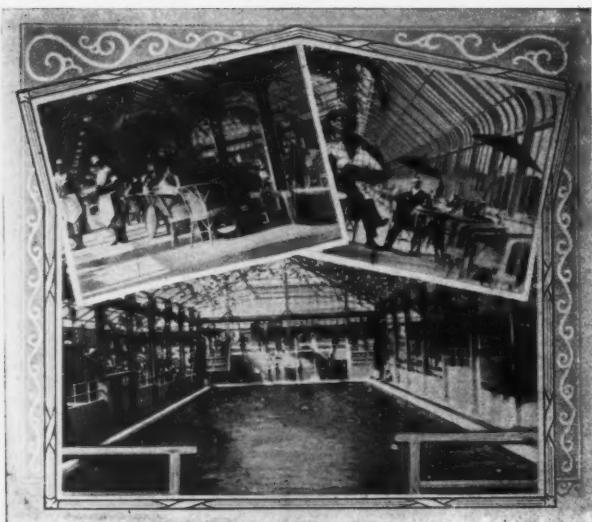
PANORAMA OF THE INNER HARBOUR AND PARLIAMENT BUILDINGS

infantile mortality is the lowest of any city of its size in the world, and although Victoria is a hospital town and consequently attracts a large number of ailing people, the death rate compares favourably with that of any other city. This is due to the remarkably mild and equable climate. The average winter day temperature is 42 degrees, the average summer day temperature 61 degrees Fahrenheit, while the average annual rainfall is only twenty-seven inches and the average daily sunshine 5.9 hours, one of the highest in Canada. There are no mosquitoes, no thunderstorms, no blizzards, no zero weather. The schools and colleges, both public and private, are excellent and attract pupils not only from other parts of Canada, but from the whole of North America and from the European Colonies in the Orient. Out-door games and sports are played all the year round, and hunters and fishermen come to Vancouver Island annually from all quarters of the globe.

The remarkably beautiful natural setting of Victoria has called forth encomiums from many famous people. Captain George Vancouver of the British Navy, who was sent by the British Government in 1792 to arrange for the transfer of Vancouver Island to the British Empire from Spain, wrote in his diary: "To describe the beauties of the region will, on some future occasion, be a very grateful task to the pen of a skilful panegyrist. The serenity of the climate, the innumerable pleasing landscapes and the abundant fertility that unassisted Nature puts forth, require only to be nourished by the industry of men with villages, cottages and other build-



FISHING—WITHIN TWENTY MINUTES OF VICTORIA, B.C.



CRYSTAL GARDENS, VICTORIA, B.C.

15,000 square miles comprises a continent in miniature and a wonderful diversity of scenery within its two hundred and eighty-five miles in length and its forty-eight in breadth. Here are fertile river valleys ideally suited for dairying, poultry farming, sheep raising, fruit growing and mixed farming generally; forest clothed hills, where game abounds; rivers, streams and mountain lakes well stocked by nature with sporting trout; estuaries and bays where salmon fishing of the best is found; mineral belts rich in coal, copper, tale and iron; and over all great virgin forests of Douglas fir, cedar, spruce and hemlock, containing over 120 billion feet of merchantable timber.

ings to render it the most lovely country that can be imagined." Rudyard Kipling—that artist in words—tries at a much more recent date to describe Victoria in the following way: "To realize Victoria you must take all that the eye admires most, Bournemouth, Torquay, the Isle of Wight, the Happy Valley at Hong Kong, the Doon, Sorrento, and Camps Bay, add reminiscences of the Thousand Islands, and arrange the whole around the Bay of Naples with some Himalayas for the background." Besides her own distinctive charm, Victoria is the acknowledged gateway to a thousand miles of Island wonderland. Geographically, Vancouver Island is by no means big as countries are measured out here in the Great West, but its



BUTCHART'S GARDENS—(Sunken Garden)



BUTCHART'S GARDENS—(Rose Pergola)

The visitor to Victoria is immediately charmed with his first glimpse of the Island capital. Beyond the graceful sweep of bay and esplanade stretch lawns and terraces, approaches to the stately Parliament Buildings; within a stone's throw lies Beacon Hill Park 154 acres in extent, its south side washed by the Straits of Juan de Fuca. Wonderful seascapes and views of the eternally snow-clad Olympics may be obtained from the cliffs and beaches. In the heart of the city; and unique to-day on the North American continent, are the all-glass Crystal Gardens, housing a heated seawater swimming tank 150 feet in length,



A DRIVE IN THE VICINITY OF VICTORIA, B.C.

the Arabian Nights, was as desolate and uninviting a place as could be found within the limits of the whole Island. Man's ingenuity, aided by the regenerative forces of Nature, has succeeded in making a paradise of an eyesore. The *raison d'être* of the gardens is a large cement mill that in its working used hundreds of tons of material and left a great gaunt excavation. This is now one of the beauty spots of Victoria. To this yawning chasm were brought countless loads of rich, black loam, and an artificial lake was made, trees were planted, lawns laid out, shrubs of all kinds were distributed, and clambering vines and rock plants were set in place. Besides the sunken gardens with their blossom-covered walls a hundred feet high, and the lake into which many waterfalls fling their silver spray, there are acres of gardens with their heavily hung pergolas; stretches of velvet lawns bordered with flowers of every description; and a Japanese or fairy garden, in which miniature trees and shrubs predominate, tiny tinkling waterfalls and wee rustic bridges, and summer houses in a setting of maidenhair ferns and lilies of the valley. This beautiful spot is eleven miles from Victoria, and the gardens, while private property, are, through the kindness of Mr. and Mrs. Butchart, open to the public every day of the week and afford pleasure to thousands of tourists from all parts.

Practically everyone looks each morning in the paper to see what the weather is going to be. In Victoria, at the Dominion Government Meteorological Observatory on Gonzales Hill one may see how this information is obtained. The main floor is devoted to the reception of weather reports from over 200 stations in British Columbia and the Yukon for statistical purposes and general climatic information. In the basement are installed on massive concrete piers very sensitive instruments for recording not

peacock promenades, concert auditoriums, gymsnasiums, palm gardens and picture galleries. On the outskirts of Victoria lies Esquimalt; the old Navy Station and the new Dominion Government dry-dock, the second largest on the continent. This giant basin, hewn out of the living rock, cost approximately \$6,000,000, and is 1,150 feet long. The dock will take any ship afloat.

Mr. Butchart's sunken gardens are to-day world-famous. Ten years ago the spot, that is now as lovely as a dream from



SCENE FROM THE MALAHAT DRIVE, VICTORIA, B.C.



GOLF—AT COLWOOD GOLF COURSE, VICTORIA, B.C.

Oak Bay, Cadboro Bay, Cordova Bay and through Saanich, taking one past such famous beauty spots as Beacon Hill Park, Gonzales Hill, Oak Bay, Gordon Head, Patricia Bay, Deep Cove, Brentwood and Mr. Butchart's Sunken Gardens, the total distance being between fifty and sixty miles. One may drive west right out to the Pacific Ocean at Jordan River, or over the famous Malahat Drive, running north from Victoria and rising to 1,250 feet above the sea, from which the view of sea and mountain is superb.

In concluding we would only add that the opportunities for golf on Vancouver Island are unrivalled. The game may be played all the year round. At Victoria there are a number of courses of which three are full eighteen hole. Two of these are wonderfully situated so as to command what the late W. T. Stead described as the finest views in the world; that of the famous Colwood Club is as fine a course as there is in America.

J. H. MOORE  
*Chairman, Publicity Committee*

#### PROPOSED AMENDMENTS TO THE CONSTITUTION AND BY-LAWS

Herewith is presented by the Committee on Constitution and By-Laws, suggested amendments to the Constitution and By-Laws, to be dealt with by Council at the annual meeting in June, 1926.

##### CONSTITUTION

###### ARTICLE VI.—AFFILIATED SOCIETIES

“Any nationally organized Medical, Scientific or Sociological Body,”—change to read, “Any nationally or internationally organized Medical, etc.”

###### ARTICLE VIII.—OFFICERS

Change the last two words of the Article “General Secretary” to read “Director General”.

###### ARTICLE IX.—THE COUNCIL

Clause (b):—Eliminate the word “Provincial”, which occurs in two places in this clause.

Clause (c):—“One delegate for each affiliated . . .”, change to read, “Two delegates for each affiliated . . .”

Clause (e):—“Chairmen of scientific sections . . .”, change to read, “Chairmen and Secretaries of scientific sections . . .”

###### ARTICLE X.—COMMITTEES

(1) “The Executive Committee”, change to read, “The Board of Directors”.

(2) “The Committee in Charge of the Legislative Bureau”, change to read, “The Committee on Legislation.”

The remaining items under Article X, shall be rearranged as follows:

- (3) The Committee on Medical Education.
- (4) The Post-Graduate Committee.
- (5) The Central Committee on Programme.
- (6) The Committee on Constitution and By-Laws.
- (7) The Committee on Necrology.
- (8) The Committee on Intra-Canadian Relations.

- (9) The Committee on Publicity.
- (10) The Committee on Public Health.
- (11) The Committee on Ethics and Credentials.
- (12) The Committee on Economics.
- (13) The Committee on Pharmacy.

The last Clause in the Article which reads "by the Executive Committee", change to read, "by the Board of Directors".

#### ARTICLE XIII.—AMENDMENTS

Second sentence,—"Amendments may be suggested by the Executive Committee without notice of motion", change to read, "Amendments may be suggested by the Board of Directors or the Committee on Constitution and By-Laws, without notice of motion."

**NOTE:**—With reference to all the Articles of Constitution, wherever the words "Executive Committee" occur, they are changed to read Board of Directors"; and wherever the words "General Secretary" occur, they are changed to read "Director General".

#### BY-LAWS

##### CHAPTER I.—MEMBERSHIP

Section 1.—Clause (a).—"He is a member in good standing in his Branch Association; except that, where no such Association is organized, he may be elected by Council after being nominated by two members in good standing in the Association;" change to read, "He is member in good standing in his Provincial Association; except that, where no such branch is organized or where any branch has waived its limits of jurisdiction, he may be elected by Council with approval by the Committee on Ethics and Credentials."

Section 7.—"Any delinquent member having once failed to comply with the sections of this article shall not be restored to membership until all such dues, as may be determined by Council, have been paid";— change to read, "Any delinquent member having once failed to comply with the sections of this article shall not be restored to membership until all such arrears or other requirements as may be determined by Council have been met."

##### CHAPTER II.—GUESTS AND VISITORS

Section 2.—"Lay members of affiliated associations or societies may, upon invitation by the President, attend the Annual Meetings and participate in the discussions of a purely scientific nature;" change to read, "Lay members of affiliated societies may, upon invitation by the President, participate in the discussions of a purely scientific nature. Lay delegates may attend meetings of Council without voting power, and may, at the request of the Chairman, take part in any of the discussions."

Section 3.—"Medical students may be admitted as visitors to either the general meetings or to the meetings of any of the sections thereof, but shall not be allowed to take part in any of the proceedings. They shall be vouched for by a member of the Association to either the President or the General Secretary;" change to read. "Any medical student may be admitted as a visitor to the general meetings or meetings of any of the sections, but he shall not be allowed to take part in any of the proceedings unless he has been specially invited to present a paper by the Committee on Programme. He shall be vouched for by a member of the Association to either the President or Director General."

##### CHAPTER III.—ANNUAL MEETINGS

Section 2.—"When the Canadian Medical Association meets in any Province where there is a Branch Association, the meeting shall be held in conjunction with that Branch Association, and the local Association

or Society shall have control of the arrangements under the direction of the Medical Association of the Province and the General Secretary of the C.M.A."

Change to read,—"When the Canadian Medical Association meets in any province where there is a Branch Association, the meeting may be held in conjunction with that Branch Association. The Branch Association or Local Society may be given control of the local arrangements for the meeting, under the direction of the Board of Directors of the Canadian Medical Association. The Canadian Medical Association assumes full control of all financial obligations and the proceeds of the meeting.

**Entertainment:**—Such entertainment as the local hosts may desire to provide, is left entirely to their discretion, but shall not be a charge against the funds of the Association.

#### CHAPTER IV.—MEETINGS OF SECTIONS

Section 2.—"The Chairman and Secretary for each section shall be appointed by the Association or Society in charge of the annual meeting", change to read,—

"The Chairman and Secretary for each section shall be elected by each section during the annual meeting, at a time provided by the Council. They shall hold office until the conclusion of the next annual meeting."

#### CHAPTER V.—ELECTION OF OFFICERS

New Section 1.—"Any five members of the Association may hand to the Director General in writing, not later than the first day of the annual meeting, the name of a member whom they may wish to nominate for any office."

New Section 2.—"The Council shall, at its first session at the time of the annual meeting, appoint from among its members, a Nominating Committee, consisting of not less than five nor more than eleven members. They shall submit nominations for officers to the Association at a later meeting of Council, at which meeting other nominations may be received, and the Council shall then proceed to elect the officers by ballot."

**NOTE:**—It will be observed that the substance of old Section 2 has been made new section 1: and new section 2 replaces the substance of old section 1.

#### CHAPTER VI.—DUTIES OF OFFICERS

Section 3.—"The Vice-President . . . . ." change to read,—"The Vice-Presidents . . . . ."

Section 6.—"The General Secretary shall be also the Secretary of the Council and also of the Executive Committee of the Association." Change to read,—

"The Director General shall be also the Secretary of Council and of the Board of Directors of the Association."

#### CHAPTER VII.—THE COUNCIL

Section 1.—"The Council shall meet at least two days previous to the opening of the Annual Meeting of the Association; and thereafter while the Association is in session, the Council shall meet daily." Change to read,—

"The Council shall meet for at least the first two days of the annual meeting of the Association, and thereafter, while the Association is in session, the Council shall meet daily."

New Section 2.—Change to read,—"During the interval between annual meetings, the Council shall meet at the call of the Board of Directors. For all such meetings of Council, due notice shall be sent to each member, stating the purpose of the meeting. The Board of Directors, if they desire, instead of calling such meetings of Council, may refer important questions to Council and obtain its decision by means of a mail ballot."

New Section 3.—The Council shall have supervision of all properties and of all financial affairs of the Association. It shall through its officers, conduct all business and correspondence, and shall keep a record of all meetings and the receipt and expenditure of all funds, and shall report upon same in the Journal after the annual meeting. In case of a vacancy in any office on account of death or otherwise, during the interval between meetings of the Association, it shall have the power to appoint successors. Before the close of each annual meeting, it shall elect the officers, select a place for the next annual meeting, and present a list of standing and special committees, appoint the Chairmen thereto, and arrange for the completion of the personnel.

New Section 4.—In order that the business of the Association may be facilitated during the interval between annual meetings, the Council shall appoint a committee of ten from its members, which shall be known as the Board of Directors. The President and President-Elect shall be ex-officio members of this Board.

New Section 5.—The Chairman of Council, at the request of five members of Council, may at any time, call a special meeting at which the Board of Directors may be annulled or changed, and for such other purposes as may be indicated in the notice of meeting.

NOTE:—The foregoing sections complete the By-Laws under CHAPTER VII, THE COUNCIL, and replace the original five sections in their entirety.

#### CHAPTER VIII.—COMMITTEES

Section 1.—Change to read,—“The Board of Directors shall meet before the close of the annual meeting at which it is elected and select its own Chairman. In all the business affairs of the Association it shall represent the Council and to it shall be delegated all the rights and powers of the Council. The Board of Directors shall report to Council at the annual meetings and at such times as the Chairman of Council may request.

This Board shall have charge of the publication of the official Journal of the Association and of all published proceedings, transactions, memoirs, essays, papers and programmes of the Association. At its first meeting, it shall appoint an Editor and a Managing Editor of the Association Journal; shall define their respective duties and fix their salaries; shall appropriate a sum from the funds of the Association, etc., . . . for the transaction of business.”

*New Closing Paragraph:*—“The Directors shall have the power, whenever occasion arises, to appoint a Court of Inquiry, consisting wholly or in part of the members of this Association. The duty of this Court shall be to hear and collect evidence,—(a) relating to any breach of ethics or professional conduct, or (b) to investigate as fully as possible accusations made in public, by spoken word, or by publication in letter or statements in the press which may be considered by the person complaining as slanderous or libellous. In making this appointment the Directors may,—(a) act on their own initiative but (b) must act whenever a request for investigation is forwarded to them by any branch association or by one of its component units or upon the written request of seven different members belonging to three separate units. The findings of this Court of Inquiry shall be returned to the Directors and if considered advisable by them, shall be referred to the Committee on Ethics and Credentials for its report. The report of the Court of Inquiry, the report of the Directors and the report of the Committee on Ethics and Credentials shall, as soon as possible, be referred to the Council for its decision. The decision of the two-thirds of the Council, present and voting at any regular or special meeting, or a majority on a mailed ballot shall determine the action to be taken by this Association. The cost of this Court of Inquiry

shall, at the discretion of the Directors, on the result of the decision, be levied as (a) a charge against this Association, or (b) a charge against the parties invoking the appointment of the Court, or (c) the Directors shall make a division of the cost between such parties and this Association.

Section 2.—“To the Committee in charge of the Legislative Bureau”, is changed to read, “To the Committee on Legislation.”

Section 3.—Old Section 3 stands.

New Section 4.—To the Post-Graduate Committee shall be delegated by the Board of Directors, the responsibility of carrying out the post-graduate plans of the Association.

New Section 5.—It shall be the duty of the Committee on Programme to co-operate with the branch Association or the local Association or Society which is actively interested in the arrangements for the annual meeting. This Committee, with the assistance of the Chairman and Secretaries of each scientific section, shall have complete charge of the preparation of the scientific programme for the annual meeting.

New Section 6, is old Section 5.

New Section 7, is old Section 4.

New Section 8, is old Section 6.

New Section 9, is old Section 7.

New Section 10, is old Section 9.

New Section 11, is old Section 8.

New Section 12, is old Section 10.

New Section 13, is old Section 11.

New Section 14, is old Section 12.

New Section 15, is old Section 13.

New Section 16, is old Section 14, and is changed to read,—“Reports of committees shall be printed and mailed to all members of Council at least two weeks before the annual meeting.”

New Section 17, is old section 15, and the last two words, “Executive Committee” are changed to read “Board of Directors.”

#### CHAPTER XI.—AMENDMENTS

“Amendments may be offered by any member of the Council and should be in the hands of the General Secretary three months before the Annual Meeting and published once in the Journal”, change to read,—

“These By-Laws may be amended provided notice of motion is placed in the hands of the Director General three months before the annual meeting. Amendments may be suggested by the Board of Directors or the Committee on Constitution and By-Laws, without notice of motion. The proposed amendments shall be published once in the Journal before the Annual Meeting. No amendment shall become effective until sanctioned by a majority vote of the Council present and voting.”

NOTE:—Throughout the By-Laws, wherever the words “Executive Committee” occur, they are changed to read “Board of Directors”; and wherever the words “General Secretary” occur, they are changed to read “Director General.”

#### INSURANCE

The Union Mutual Casualty Company, with home office in Des Moines, Iowa, has widely circularized the medical profession in Canada offering disability insurance by a mail order plan. A foot-note on their stationery reads as follows:—“Fully authorized to write disability insurance by mail in the United States and Canada.” On February 11th, 1926, I addressed a letter to Mr. G. D. Finlayson, Superintendent

of Insurance, House of Commons, Ottawa, asking if the Union Mutual Casualty Company of Des Moines, Iowa, was licensed to transact business in Canada. Under date of February 12th, 1926, Mr. Finlayson replies as follows:—"Relying to your letter of the 11th instant, I may say that the Union Mutual Casualty Company of Des Moines, Iowa, is not licensed to transact business in Canada and there is, therefore, no protection for Canadian policy holders by way of deposit with the Receiver General." On February 17th, 1926, I addressed the following letter to the Union Mutual Casualty Company, Des Moines, Iowa:—"On the bottom of your letterhead, I note the following printed statement, 'Fully authorized to write disability insurance by mail in the United States and Canada.' Would you please be good enough to advise me fully of your authority to write disability insurance by mail in

Canada. I may say that the Federal Department of Insurance at Ottawa, Canada, advises me that your Company is not licensed to transact business in Canada, and that there is, therefore, no protection for Canadian policy holders by way of deposit with the Receiver General. I await your early reply." Up to this date, April 13th, 1926, no reply has come to this letter from the Union Mutual Casualty Company. This information is published for the benefit of the medical profession in Canada.

Just here a warning should be brought to the attention of the medical profession against placing insurance with any Company which is not licensed by Canadian Federal and Provincial authorities to do business in Canada, with protection thereby of the rights and interests of the policy holders.

T. C. ROUTLEY  
General Secretary

## Miscellaneous

### DOCTORS AND THE PUBLIC

*Editorial in the Weekly Times, March 11, 1926.*

Lord Dawson's address to members of Parliament recently has hardly received the attention which it deserved, but it should do a good deal to resolve the present dispute between the public and the medical profession. Resisting the temptation to discuss particular cases, and the still greater temptation to indulge in special pleading, he enunciated two principles as properly governing all the actions of the doctors. In the first place the good of the public must be the overriding consideration in every controversy; in the second place the medical profession must make use of knowledge in whatever quarter it could be found, provided that such knowledge was for the benefit of the public. These principles, if correctly applied, offer an immediate solution of all the outstanding difficulties of the moment. The trouble, of course, is their application, which is not so easy or so simple a matter as many people appear to think.

"The good of the public," in fact, is an elastic phrase which may be made to cover a vast number of purely personal aims or ambitions. Lord Dawson's real service lay in the attempt which he made to offer some definition of the term which should—so far as the practice of healing is concerned—satisfy the minds of reasonable men and women. He invited his hearers to remember that an essential preliminary to the treatment of disease is knowledge of its nature. Diagnosis must precede therapy. As it happens, diagnosis is by far the most difficult task which faces the physician. In order to be able to interpret the symptoms of disease a man must know and understand the nature of these symptoms and the mechanism of their production. Such knowledge and such understanding cannot be achieved without a prolonged training of the mind, and without acquaintance with a group of sciences each of which can be mastered only by intensive study. In other words, it is idle to contend that the public good can be served by ignoring the patiently acquired knowledge of hundreds

of thousands of workers, past and present, in this and other lands. The fatal weakness of the unqualified practitioner is not his lack of a medical degree, but his lack of that knowledge of disease which, however imperfectly, enables a qualified man to interpret the signs presented by his patient, to distinguish one sign from another, and to relate these signs to prognosis and treatment. The immemorial demands of the patient: "What does this sign mean for me? How am I to deal with its presence?" cannot be satisfied unless and until information about the normal action of the body and about the causes and methods of departure from the normal is available. So true is this that it is a matter of common experience that unqualified practitioners are apt to express themselves in the language of the qualified, to make use of diagnoses already arrived at by orthodox medicine, and to base their systems of treatment on such scatterings of the science of medicine as they may happen to possess.

To contend, then, that the public interest can possibly be served by exempting anyone, who is to enjoy the status of a registered medical practitioner, from training in those sciences by means of which alone a diagnosis of disease can be made is on the face of it ridiculous. There can be no "back-door" to the Medical Register. Nor can the public suffer for a moment any delegation by doctors of their right to determine the nature of a patient's complaint. Once, however, this crucial matter has been settled, and a line of treatment laid down, the doctor may delegate, under a general medical guidance, the responsibility of treatment to skilled persons who do not possess a medical diploma. This has already been done in the case of midwives. Lord Dawson went on to say that there was a place in the treatment of disease under such general guidance for the gifted fingers of the bonesetter, for the delicate touch of the masseur, for the spiritual aid of the "healer" and the Christian Scientist, and for the highly skilled operator with rays. All these have their uses; but such uses do not, and cannot, transcend the fundamental necessity of recognizing in the first instance

the nature of the complaint to be treated. On that necessity rests the case for the medical profession. Where the right to diagnose is not threatened the General Medical Council may well afford to be generous, since its generosity cannot harm the public. Incidentally Lord Dawson's frankness and fairness, and the impression which he made on his audience, show clearly how much it is to the public interest that medical men should be able to explain their difficulties and to elucidate the reasons for the rules by which they are guided. There is no doubt that his wise words will receive the support of his own profession as well as of the public.

### STILLBIRTH INVESTIGATION IN LONDON, CANADA, FOR THE YEAR 1924

AUTHORIZED BY THE CHILD WELFARE BOARD OF  
THE WESTERN ONTARIO ACADEMY OF MEDICINE

*Conducted by H. W. Hill, M.D., D.P.H., L.M.C.C.*

*Dean of the Faculty of Public Health of the  
University of Western Ontario in Co-  
operation with The London Child  
Welfare Association*

This investigation took the form of a questionnaire addressed to physicians who had reported stillbirths during 1924; and individual questioning of the mother in those cases where the physician consented to it.

Total stillbirths reported .....	93
Questionnaires answered .....	50
Classifiable returns .....	46

The prenatal care recorded above is that af-

firmed by the attending physician. It varied from "complete" (from the second month on) to "three visits preceding confinement."

*Comments.*—While not a great deal can be deduced from a consideration of so small a set of figures, it is interesting to compare them with those of an English authority, Eardley Holland.

Re-arranged table (from Eardley Holland—"Causation of Foetal Death", page 127—Ministry of Health, London, England.)

Holland therefore concludes that *fatal deaths* can be cut in two—by prenatal work alone, 21 per cent (items 1, 4, 7), by prenatal work and improved obstetrics 12 per cent (items 1 and 4), by improved obstetrics alone 20 per cent (item 1), total 53 per cent.

The largest percentage reduction in any one item may be made in complications of labour, by combined prenatal and obstetrical work; i.e., 60 per cent; in toxæmia of pregnancy, 60 per cent; in chronic, renal and other diseases, 50 per cent.

*The most important single item, yielding the largest absolute reduction, lies in the physician's hands, i.e., reduction in the deaths due to complications of labour.*

If these English figures are correct, it should be possible to reduce our present appalling number of stillbirths (93 stillbirths in 1924) to about 45 annually.

#### PHYSICIANS' EXPLANATION OF CAUSE OF STILLBIRTH

Condition of Mother	Prematurity	Prenatal care	Condition of Child	Prematurity	Prenatal care
Pelvis contracted (English 3; Can. 4; U.S. 1) .....	8	2	5	0	2
Eclampsia and alb. ....	5	4	2	1	3
Fall and shock .....	5	3	3	0	0
Hæmorrhage .....	3	1	1	0	1
Diabetes .....	2	1	1	0	1
Pernicious anæmia .....	1	1	1	1	0
Placenta previa .....	1	0	1	0	0
Dystocia and delay .....	1	0	1	0	0
	26	12	15	20	7

	Incidence (%) as cause of foetal death	Proportion Preventable (%)	Period at which pre- ventive action is required
1. Complications of labour.....	51	30	Chiefly at confinement
2. Syphilis .....	16	16	Preceding confinement
3. Cause undeterminable .....	11	0	.....
4. Toxæmia of pregnancy .....	10	6	Preceding and at confinement
5. Placental insufficiency, etc. ....	6	0	.....
6. Foetal deformities .....	5	0	.....
7. Chronic renal and other disease... .....	2	1	Preceding confinement

100%                    53%

## Obituaries

**Arthur Robertson Cushny, M.A., M.D., LL.D., F.R.S.**, PROFESSOR OF MATERIA MEDICA AND PHARMACOLOGY, UNIVERSITY OF EDINBURGH, died suddenly at his home in Edinburgh on February 25th. Two days previously he had been at an important conference in London, apparently in his usual good health. His death will occasion very deep regret to the English speaking profession in every land. The son of the late Rev. John Cushny of Speymouth, Morayshire, he was educated at the University of Aberdeen, where he graduated M.A. 1886, M.B., C.M., in 1889, and M.D. in 1892. For a year he was assistant to Schmiedeberg in Strasbourg and while there he was offered the Chair of Pharmacology at Ann Arbor in the University of Michigan, to fill the vacancy caused by the appointment of John J. Abel to the lectureship on pharmacology at Johns Hopkins Medical School. While at Ann Arbor he carried out important studies on the action of digitalis on the heart and brought out the first edition of his well-known text-book on pharmacology. In 1905 he was appointed professor of pharmacology at University College, London, a post which he held until 1918, when he was offered the Chair of Materia Medica and Pharmacology in the University of Edinburgh, a position he accepted with pleasure as taking him back to the land of his childhood. His most recent research was the investigation of the manner in which pharmacological action is modified by the optical activity of alkaloids, a research which formed the subject of the Dohme lectures delivered last year in Baltimore. His text-book on pharmacology and therapeutics is now in its eighth edition, and is recognized as one of our most trustworthy guides on the action of drugs.

Apart from his activities in advancing the knowledge of pharmacology, Professor Cushny had an extensive knowledge of the history of drugs, and in particular was an authority on the life of Withering, the discoverer of digitalis. Only a week before his death Professor Cushny had agreed to annotate for the Royal Society of Medicine, the collection of Withering's letters bequeathed to the society by Sir William Osler.

**AN APPRECIATION BY JONATHAN C. MEAKINS, M.D., F.R.C.P., ED.**, PROFESSOR OF MEDICINE AND DIRECTOR OF THE DEPARTMENT: FORMERLY CHRISTISON PROFESSOR OF THERAPEUTICS, UNIVERSITY OF EDINBURGH: The death of Arthur Robertson Cushny at the early age of sixty has robbed pharmacology of one of its most illustrious scientists; one who may be referred to as the father of modern pharmacological science in the English speaking world. His work and influence while professor of pharmacology at the University of Michigan (1893-1905) and later at the Universities of London and Edinburgh, made him an outstanding figure in the science to which he unselfishly devoted his life.

Posterity will know his name as one who laid the foundations of this science with a single-mindedness for truth which went far in removing the superstitions and dogmas surrounding the action of drugs and other remedial agents. But his numerous friends, colleagues and students will feel deeply his loss for other reasons as well. They took his scientific attainments for granted, as would any who had the privilege of benefitting by his clear judgment and kindly but severe criticism.

Those who knew him best will chiefly miss him on account of his robust loyalty, sympathy and encouragement. At the council table he was listened to with attention and respect. All his advice was

based upon sound common sense, and the belief that a thing worth doing or knowing was worth a high standard of attainment seemed always to be his watchword.

Kindliness and absence of ostentation in his dealings with his fellowman made him beloved by his colleagues and students alike. Particularly through these qualities did he endear himself to those who had the privilege of partaking of his hospitality in house or garden. In the latter he laboured long and happily with quiet pride in the beautiful rockeries he constructed on the banks of Braid Burn where he meandered through the grounds of ancient Peppermill House.

The kindly smile and picturesque figure of Cushny will be seen no more in the "New Quad" of Edinburgh, but the affection and regard which he implanted in the hearts and minds of his colleagues and students during eight short years will keep his memory green.

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**Arthur Charles Hawkins** died at Halifax on the 19th of March. Dr. Hawkins graduated at McGill in 1885, and after serving a term as house surgeon at the Victoria General Hospital took up practice in Halifax. He interested himself in civic matters, and had a seat in the city council as alderman for several years and as mayor for a term. He once contested Halifax county for a seat in the provincial legislature, but unsuccessfully. He enjoyed a large practice. Some years ago he suffered from an attack of pneumonia from which he never fully recovered, and several months before his death he was obliged to withdraw from professional activities. Dr. Rupert Hawkins, of Halifax, is a son.

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**Dr. Richard Raikes** who has practised in Midland for nearly forty years died there on April 7th after a short illness. The son of the late Walter Raikes, he was born in Barrie and graduated from Trinity in 1881. At the outbreak of the war, though well over age he went over seas and saw active service with the 4th Battalion, he served through the whole war and was later attached to the War Department in England. One of the finest type of Canadian medical men, Dr. Raikes gave long service in medicine to the community about Midland and invaluable help to the military medical and combatant service by his inspiring conduct. Few men of his age went through the front line service and few were able to continue through the whole war. Well known in Midland he was respected as an able practitioner and looked up to as one upon whom all could rely for conscientious consideration of their condition. He was buried with full military honours on April 10th.

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**Dr. Edward Emmanuel Phoenix** a graduate of the Western University died from pneumonia on April the 4th in his forty-second year. Dr. Phoenix had been working actively at his practice and was stricken while in the performance of his duties. He had been working in Toronto for the last nine years.

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**Dr. Alexander Douglas Kay** a native of Windsor died in Detroit on March the 14th in his thirty-eighth year.

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**Dr. Charles A. Page** a graduate of Trinity in 1898, and one of the best known of the rural practitioners of Ontario died in Oakville on March the 2nd after a very brief illness. One of the most active men in his profession, Dr. Page was at his duties up to

within a few days of his death, and like Dr. Phoenix whose death is noted above, probably contracted his fatal illness while in attendance on some of the many pneumonia cases which the practitioners have had to treat.

**Dr. J. B. Lalonde** died recently at his home, at the age of fifty-four. He completed his professional studies at the University of Montreal from which he graduated in 1895. He was actively connected with a number of charitable organizations.

**Dr. J. P. Leduc** died at Marieville, where he had been practising for thirty-five years.

**Dr. L. V. Benoit** of St. Hyacinthe, was taken by death after a short illness the early part of this month.

**Dr. Gordon Stewart Mundie**, Associate Medical Director, Canadian National Committee for Mental Hygiene, and Medical Director, Mental Hygiene Committee of Montreal, died on April 7th at the Royal Victoria Hospital, where for some months he had been confined to his bed on account of a gradually increasing paralysis. Born near Montreal in February, 1885, he received his early training in the Winnipeg Collegiate Institute, and entered McGill University in 1902, passing first through the Faculty of Arts and afterwards through that of Medicine,

graduating in 1910. Immediately after graduation he went to Germany, studied under Erb at Heidelberg, and afterwards visited Frankfurt, London and Edinburgh, devoting his studies entirely to neurology. On returning to Montreal, he was made clinical assistant in neurology at the Royal Victoria Hospital, and assistant demonstrator in Clinical Medicine in McGill University, being promoted later to be assistant physician in charge of psychiatry and lecturer in that subject at the Medical School.

During the war, he acted as consultant in neurology at M.D. 4, and despite his continued disability, officiated for a number of years as Associate Medical Director of the Canadian National Committee for Mental Hygiene. During this time he was editor of the Mental Hygiene Bulletin, took an active part in the welfare activities of the city and published a number of very stimulating articles to promote the cause of his favourite pursuit.

Dr. Mundie's charming personality, his generous attitude towards his colleagues, his conspicuous, disinterested service to the cause of medicine, gave him a standing in the profession and in the community which any physician might well envy. One cannot resist emphasizing the marvellous courage and patience with which, throughout nearly twenty years, he faced the inevitable outcome, never flinching in his duty towards his patients, his public interests, and his personal friendships.

C. F. MARTIN

## Medical News from the British Empire

### IRELAND

The question of registration in the Irish Free State is still unsettled, and the complications arising from the situation are exemplified in the following incident. Two years ago plans were formed to bring about an amalgamation of at least five of the city hospitals of Dublin. The initial cost of the scheme appeared to be prohibitive, but after negotiations the committee had almost concluded arrangements for a gift of a large sum of money from the Rockefeller Foundation, when the Rockefeller authorities broke off negotiations until such time as the vexed question of medical registration should be settled satisfactorily.

In a recent speech Mr. R. C. B. Mausell, President of the Royal College of Surgeons, pointed out that nothing had been done since the conference last December between a committee of medical men and President Cosgrave. "Two very important things happened at that conference," he said "We were informed that a bill would be introduced extending the existing system for six months or more, in order to give time for the discussion of a permanent arrangement. This has been done, and, as you are all aware, the present system can be continued until the end of the year. Suggestions for a permanent arrangement, which

should be satisfactory to both sides, were submitted by the committee. These suggestions were received sympathetically, and three medical men were chosen as a subcommittee, at the request of President Cosgrave, to discuss details with the ministers and lawyers who would frame the bill. Since the date of that conference, December 21, 1925, these three medical men have not been consulted in any way about this vitally important matter. Meanwhile, our medical students continue to stray to other seats of learning, and in all probability the Rockefeller money will be applied to public health matters in China or some other enlightened country. We are deeply grateful to the Government for renewing the old system and so preventing chaos, but I for one would like the details of the permanent arrangements thrashed out, as promised by the President. No medical man will deny intervals of sleep to hard-worked ministers and lawyers, but to sleep, apparently continuously, from December 21st to February 17th is perilously near to sleeping sickness." Mr. Mausell added that he had raised his voice that day in the hope that it might be wafted across Merrion Street, into the Local Government Board Office.

## News Items

### GENERAL

The Annual Meeting of the Canadian Society for the Study of Diseases of Children will be held in the Gananoque Inn, Gananoque, on June 11th and

12th. The hotel is delightfully situated on a point overlooking the St. Lawrence River.

Visitors are welcome at all scientific meetings.

Further information may be obtained from the Secretary-Treasurer—Doctor H. P. Wright, 40 Trafalgar Avenue, Montreal.

**AMERICAN BOARD OF OTOLARYNGOLOGY.**—In addition to the examination held at Dallas on April 19th and at

San Francisco on April 27th, another examination will be held at the Otolaryngological Clinic, Royal Victoria Hospital, Montreal, on Tuesday, June 1st.

Information may be secured from the Secretary, Dr. H. W. Loeb, 1402 South Grand Boulevard, St. Louis, Missouri.

### NOVA SCOTIA

The town of Truro has voted the sum of \$20,000.00 towards the cost of the new hospital building now under construction.

Drs. K. A. MacKenzie and H. B. Atlee, of Halifax, have been invited to address medical societies at Moncton, Campbellton, Fredericton, Woodstock and St. John, under the scheme of the Canadian Medical Association for extra-mural post-graduate instruction.

Among Nova Scotian physicians now holidaying in the sunny south are Drs. J. G. MacDougall, S. J. MacLennan and Smith L. Walker, of Halifax, Dr. J. A. M. Hemmeon, of Wolfville and Dr. E. C. MacDonald, of Sydney. Dr. W. F. Read, of Digby, returned recently after spending several enjoyable weeks in Florida.

Some years ago the Dental Act was so amended by the provincial legislature that a dentist might employ unqualified assistants. At the recent session of the legislature an endeavour was made to have this legislation rescinded, but the bill was so changed in the committee of the legislative council that it was withdrawn by its promoters. A bill introduced for the purpose of requiring the Pharmaceutical Association to admit to registration a man who proved unable to pass the qualifying examination was very properly rejected by the legislature.

The February meeting of the Osler Medical History Club of Halifax was held at the residence of Dr. E. Kirk MacLellan, who read an interesting paper on the evolution of the obstetric forceps, dealing particularly with the Chamberlins. Dr. MacLellan showed his collection of forceps, containing some specimens of much historic interest. For the March meeting, Dr. George H. Murphy was the host and gave a very instructive paper on Guy de Chauliac and his times, one of the best presented papers with which the club has been favoured.

The Medical Society of Nova Scotia will hold its annual meeting at Halifax, under the presidency of Dr. E. V. Hogan, on the 7th and 8th of July. As business matters of much importance to the profession are to be discussed a large attendance is expected. The address in surgery is to be given by Dr. Frank Lahey, and the address in medicine by Dr. Joseph H. Pratt both of Boston. Dr. Harold S. Vaughan, of New York, will contribute a paper on cleft palate. The committee promise a programme which will be unusually attractive, and arrangements are being made for the adequate entertainment of visitors.

The post-graduate course arranged by the faculty of

Medicine of Dalhousie University will begin August 23rd, and will, as usual, be open free of charge to all qualified practitioners. The committee is having the co-operation of the Canadian Medical Association and the Canadian Tuberculosis Association, both of which organizations have assisted in procuring lecturers. Among those not connected with the faculty who will contribute to the course are Sir Henry Gauvain, of England, Dr. Stuart Pritchard, of Battle Creek, Mich., and Drs. John Fraser, W. F. Hamilton and L. J. Rhea, of Montreal.

A conference was held at Moncton on March 9th to discuss a programme for combating tuberculosis in the maritime provinces, in which Nova Scotia was represented by Hon. Dr. Rehfuss, of the provincial government, Drs. Jost, Chisholm and Campbell of the provincial department of health, and Dr. Miller of the Nova Scotia Sanatorium, Kentville. The Canadian Tuberculosis Association was represented by its Secretary, Dr. R. E. Wodehouse. It is understood that, if certain sums of money are raised in the several provinces, the Canadian Tuberculosis Association will be able to provide material financial aid to further a comprehensive scheme for the control of a disease which bulks large in the mortality returns of the maritime provinces.

A statistical study of tuberculosis in Nova Scotia has recently been issued by the Department of the Public Health. In this, a careful analysis is made of the age distribution of deaths from the pulmonary and non-pulmonary forms of the disease. The period covered is from 1909 to 1924. For 1910 the mortality rate (all forms) was higher than for 1909, but each succeeding year shows, almost without exception, an improvement over its predecessor. The rate for 1924 was 125 per 100,000, as against 215 for 1910. The improvement, however, has been almost limited to pulmonary tuberculosis, and to certain age groups. Rural communities show greater improvement than urban communities. The age groups most affected correspond to what might be termed the sanatorium age period, although the period 0-5 also shows a marked improvement. Deaths from non-pulmonary tuberculosis fluctuate in number from year to year, but there is little evidence of any real gain. As far as sex is concerned, the death rate of males from pulmonary tuberculosis has been consistently lower than that of females, while in the case of non-pulmonary forms it has been the reverse. The death rate from pulmonary tuberculosis has declined in both sexes, but to a greater extent in males than in females. In some age groups, the improvement in respect of tuberculosis is not keeping pace with the improvement in the general death rate. Tuberculosis accounts for nearly half the deaths in the age group 20-29.

W. H. HATTIE

### NEW BRUNSWICK

The St. John District Board of Health framed and promulgated a new set of regulations regarding the boarding of infants. These regulations specify a high

standard of ability and morality for persons wishing to undertake the care of such infants and provides for the regular and rigid inspection of such boarding places

and adequate medical supervision of the infants themselves.

At the annual meeting of the St. John City Medical Society held in April, the following officers were elected: President, Dr. Victor Davidson; Vice-President, Dr. J. R. Nugent; Secretary, Dr. E. Lunney; Treasurer, Dr. F. T. Dunlop.

After a number of years inactivity, during and immediately following the war period, the St. John Medical Society resumed its activities during 1925 under the Presidency of Dr. L. DeV. Chipman. It is hoped that this year also the Society will have many meetings of much interest to its members.

Dr. C. M. Kelley is at present in New York doing post-graduate work. Dr. Kelley has for a number of years spent the month of April in some of the larger centres in the United States and is always to be depended upon to bring back the details of some new work of interest.

Dr. W. Rowley is now convalescing at his home on Wellington Row, St. John, N.B., and is making satisfactory progress following an injury with fracture of his right tibia and fibula which he suffered some time ago.

The death occurred in March of Mrs. Mary Louise Farris, widow of the Hon. L. P. Farris and mother of Dr. Hugh Farris of the Saint John County Hospital. The sympathy of the Doctor's many friends has been extended to him in this his latest bereavement; his father died on December 9, 1925.

A rather severe epidemic of influenza is now occupying the attention of the medical profession in New Brunswick. Its advent was heralded by newspaper reports in the United States, Great Britain and the upper Canadian Provinces. This year, the disease is of a type that affects chiefly the bronchial tubes, larynx, pharynx and nasal sinuses and is associated with the usual severe toxic depressive syndrome which

is so well known. There have been a few cases of pulmonary influenza, a type which has been the cause of a number of deaths. There is also another type epidemic at present that gives rise to gastrointestinal symptoms. A feature noted in the present epidemic is the tendency to enlargement of the glands some of which come to suppuration. Quite a number of St. John physicians have suffered from the prevailing malady.

The annual meeting of the Council of Physicians and Surgeons of New Brunswick was held on April 14 in Saint John. The members of the council present were: Dr. W. D. Rankin, Woodstock, N.B.; Dr. G. C. VanWart, Fredericton, N.B.; Dr. F. Murray, Albert, N.B.; Dr. P. C. Laporte, Edmundston N.B., and Drs. W. W. White, G. A. B. Addy, S. H. McDonald of Saint John, N.B. Routine business was transacted and the following officers were elected: President, Dr. P. C. Laporte, Treasurer, Dr. G. A. B. Addy, Secretary-Registrar, Dr. S. H. McDonald.

At the Municipal elections held in Saint John early in April, Dr. W. W. White was elected for the term of two years. Dr. White's election was extremely important to his native city as there are many questions of importance to be acted upon in the near future. The new mayor is especially fitted for this office on account of his training, ability and previous experience in the council, and his well known interest in everything for the betterment of conditions in the city.

The monthly report of the Moncton City Hospital for March contains many items of interest; one of the most important is the marked increase in the number of cases treated and also the financial statement. It was decided at this meeting to increase the efficiency of the x-ray department by purchasing a portable x-ray unit.

Dr. Mayes Case of Saint John has lately returned from a six weeks tour of Eastern American Medical Centres. Dr. Case on his trip, combined his vacation with attendance at various clinics of interest.

A. STANLEY KIRKLAND

## QUEBEC

Dr J. G. Copeland, B.A., assistant superintendent of the Montreal General Hospital since 1923, and recently appointed superintendent of the Albany General Hospital at Albany, N.Y., has taken up his new duties in the latter institution. Previous to taking up his new post, Dr. Copeland toured the United States and visited all the big hospitals in various centres. Dr. Copeland was active in his undergraduate days and in 1920 and 1921 was president of the McGill University Union. In his final year at McGill he was elected president of the Students' Council, the most important student office in the University.

McGill University received as a permanent home for McGill Rowing Club, the gift of the fine lakeshore property and boathouse at Lakeside, owned since 1883 by a group of well-known Montrealers under the title of "The Syndicate". The property, which makes an ideal home for the club consists of about an acre of land, a wharf and a two-storey boathouse. A breakwater built by the original members of the syndicate runs along the water front. The gift has been made in the conviction that the fine sporting traditions which grew up during the occupation of the syndicate will be perpetuated by the students of McGill.

The report of the Brehmer Rest Preventorium

indicates how much preventive work has been done in the treatment of incipient cases of tuberculosis, especially in young people, by affording them rest, sunlight and fresh air and a good simple dietary up in the Laurentian hills with beautiful nature all around them. Decided health improvement has been noted in all and many have gained considerably in weight. A great advantage to be secured by a few months sojourn in such a home is not only the immediate gain in health but the education in the rules of healthy living which are rigidly enforced.

During this first quarter of the year, we are glad to note that the city health officer reports fewer cases of contagious diseases and a lower mortality rate than for some years past: Out of the 2272 cases reported at the City Hall there were only 296 deaths. Last year by this time 2919 cases had been reported with 396 deaths.

In the annual report of the Alexandra Hospital for contagious diseases for 1925, among the 1517 patients under treatment fifty-one deaths occurred. This, which was the gross mortality, is a percentage of 3.65. Excluding those moribund on entrance and dying within forty-eight hours the net mortality was only 2.15 per cent. A number of very malignant cases of diphtheria who received the antitoxin in too small doses to be effective, and died shortly after entrance raised

the year's mortality to 8 per cent for this disease. The mortality for scarlet fever was distinctly lowered, the total death rate was 1.84 per cent but the net only 1.4 per cent. It is hoped that in the statement for 1926 there may be a still greater decrease as scarlet fever antitoxin is now employed in almost all the cases and definitely decreases the severity of the attack, producing a fall in temperature and a decided improvement of the patients' well being within thirty-six hours.

Several outbreaks of measles took place during the season when, owing to the press of urgent cases, it was not possible to keep the patients in the cubicles for the full length of time. By the employment of serum taken from adults who had had the measles previously, these outbreaks were definitely checked. All in the ward, in which any development of measles occurred were at once immunized. This is a very definite advance, and it is hoped that by next year knowledge will have advanced so that a definite serum or antitoxin as in scarlet fever and diphtheria can be employed in measles. During November and December a case of chicken pox occurred in one of the wards. By the use of convalescent blood serum taken from an adult who had recently had the disease its development was successfully checked in thirteen out of fourteen contacts.

In addition to these three diseases, at the request of the city health officer the hospital took in during the year seventy cases of erysipelas, seventeen cases of parotitis, sixteen cases of chicken pox, sixteen cases of whooping cough, one case of typhus fever, three cases of poliomyelitis.

During the year thirty mastoid operations took place in the hospital, and there were thirteen cases with nine recoveries in which intubation was employed when suffocation from membrane in the throat was threatening.

The annual report of Dr. Boucher, M.O.H., Montreal, has been published. The tremendous strides in anti-tuberculosis effort in Quebec cannot be better appreciated than by reading this city report which portrays the working of every known helpful activity in this important centre. In addition at least five if not six chest clinics with follow-up nursing services, he still recommends more. He announces 500 more treatment beds available for 1926 and feels that when these are occupied he will urge provision of more of the type then evident to be the greatest need.

The Three Rivers-Cap de la Madeleine demonstration has completed two years' work, hospitalized sixty-four people with tuberculosis, attended from its dispensary 175 additional cases in homes, examined over 5,000 citizens, diagnosed 422 cases of tuberculosis in the demonstration area and surrounding district, opened a summer camp where child contacts of cases were wonderfully helped, and interested a group of citizens in forming a corporation to build a fifty-bed sanatorium, \$75,000 for which is already available. This in addition to causing the city health budget to be trebled in three years and the spending of over \$60,000 on the demonstration itself.

GEORGE HALL

## ONTARIO

ONTARIO MEDICAL ASSOCIATION ANNUAL MEETING, LONDON,  
May 25, 26, 27, 28, 1926



NEW SCIENCE BUILDING OF THE UNIVERSITY OF WESTERN ONTARIO JUST COMPLETED

The preliminary programme of the O.M.A. meeting in London for May 25th-28th was presented in the last number of the *Journal*. In its arrangement the purpose of the committee is worked out to advantage. The subjects are chosen with an appeal to the general practitioner, and the names of those contributing give

the assurance of an interesting presentation of each subject to specialist and practitioner alike. It is proposed to confine the papers strictly to the time allotment; the discussion which will follow at the close of each session will be limited as far as possible to questions.

The programme gives evidence of a happy



NEW ARTS BUILDING OF THE UNIVERSITY OF WESTERN ONTARIO

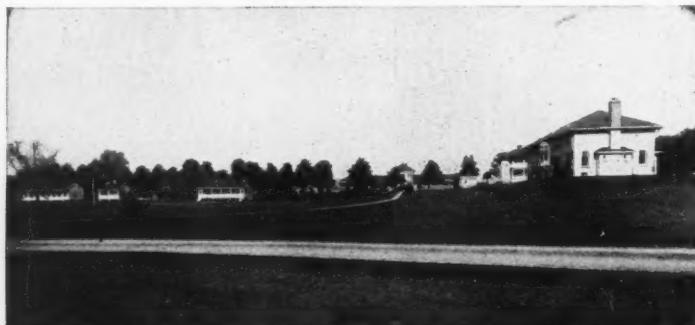
arrangement in interprovincial and international courtesy, and the speakers selected from the adjoining provinces and the neighbouring republic are representative and outstanding physicians.

The Society acting as host—the Western Ontario Academy of Medicine—is sparing no efforts to make the meeting a success in every way. A variety of interesting entertainments will be offered, not the least of which are the opportunities afforded to those who enjoy golf on the three excellent courses of which London can boast.

bodies and Chamber of Commerce have issued a neat illustrated booklet which will convey to the physicians of the province the expression of welcome which awaits their convention in London.

The opportunities for a short holiday are ideal at this meeting of the Ontario Medical Association and it is hoped that the attendance will be large.

The C.A.M.C. ex-service officers, and men who have since the war attained their medical degree, have a promise of an interesting reunion luncheon during the meeting of the



ON THE SANATORIUM GROUNDS

These dates are also those of the Convocation week in the University of Western Ontario in Arts, and in the several Faculties connected with Medicine, and visits to these institutions will have the additional attraction of being able to witness the commencement activities which will be in progress.

Considerable civic interest is already being shown in the meeting. The Mayor and Civic

Ontario Medical Association in London.

While this is not an official number on the programme, arrangements are being directed to get together a noon hour meeting of all those of the profession who saw service in any of the theatres of the Great War. There will be no formal programme of speeches, but it is quite in order that the meeting will furnish many renewals of khaki comradeship.

The Radiological Society of Ontario will hold a meeting of its members at some time during the days of the convention.

The Laennec Society and the Trudeau Society of tuberculosis specialists are meeting on May 25th at Queen Alexandra Sanatorium as guests of Dr. F. H. Pratten, Superintendent. It is expected that there will be fifty or more present, and an interesting programme, which appears elsewhere in this number, will be furnished.

The plans of the local committee of arrangements have been completed and the stage is set for what is hoped will prove one of the most enjoyable meetings in the history of the association. It remains for the practitioners of the province to add their measure to its success by attending as many of the meetings as possible.

G. A. RAMSAY

#### THE OTTAWA MEDICO-CHIRURGICAL SOCIETY

The annual dinner of the Society was held at the Royal Ottawa Golf Club on the evening of February 18th. The President, Dr. R. E. Valin occupied the chair and addresses were given by the Hon. Dr. Manion, M.P., and Dr. J. E. Chabot, M.P. Following the dinner the evening was spent in social intercourse. About one hundred members were present.

The regular meeting of March 5th took the form of a clinical night at the Civic Hospital. An excellent and well-balanced programme was presented by members of the staff.

Dr. W. E. Fraser read a short paper on congenital strabismus emphasizing the importance of the use of proper glasses in early childhood. Papers were also read by Dr. R. S. Stevens on mucous colitis and Dr. George Hooper on two cases of endometritis, typical of malignant and non-malignant disease. Cases were also presented by Drs. Leggett and Whitton. An excellent display of mounted pathological specimens, prepared for the hospital museum by Dr. Thomas Little, were on view.

The closing meeting of the season, which is also the annual meeting of the Society was held on Friday, March 19th. Dr. J. G. Fitzgerald of Toronto University was the speaker of the evening on "A Brief Survey of the Development and Present Status of Specific Methods for the Control of some of the Communicable Diseases" (illustrated). The following officers were elected for 1926-27: Hon. Presidents, Drs. Horsey Powell and H. B. Small; President, W. S. Lyman; First Vice-President, R. Nagle; Second Vice-President, W. F. Mayberry; Secretary, J. A. Dobbie; Curator, D. E. Winter; Librarian, E. P. Byrne; Committee, Drs. Lapointe, Brunet, Watterson, Whitton, Barnhart, Barlow and Valin.

H. B. SMALL

#### THE HARVEY CLUB SEVENTH ANNIVERSARY BANQUET

The completion of the seventh year of the Harvey Club was celebrated in a fitting manner by its members and their guests at a banquet held in the Tecumseh House on Friday evening, February 19, 1926. An excellent dinner was followed by an interesting toast list, at once instructive and entertaining. In the rôle of toastmaster, Harvey Crane kept everyone in good humour. Replying to the toast

to the Harvey Club, he outlined briefly the activities of the club since its inception. The address of the evening was provided by Harvey Spence, who presented a very interesting review of the history of medicine from the time of Hippocrates to Harvey's epochal discovery of the circulation of the blood. He emphasized the value of experimental medicine in overthrowing the theoretical and superstitious dogmas which had passed from generation to generation as truth.

Dr. F. J. H. Campbell, representing the Western Ontario Academy of Medicine, spoke of the contributions to medicine made by Canadians. He pointed out that although Canada as a composite nation was not a century old, yet her contributions have been outstanding so that her name stands high in the scientific world. He mentioned among others the work of Osler, Barker and Banting.

Dr. E. W. Fuller spoke of the value of good dentistry as a factor in health and emphasized the importance of prenatal care for the mother, and the care of the first teeth of the child. Disease of the temporary teeth usually means disease of the permanent teeth. A proper diet is one of the best preventatives of dental diseases, and indirectly diseases of the rest of the body.

In a very witty speech Harvey McIntosh of Simcoe replied to the toast to the ladies.

The following officers were elected for 1926-1927; Honorary President, Dr. J. W. Crane; President, Dr. E. Spence; Vice President, Dr. A. J. Grant; Secretary, Dr. F. W. Luney; Treasurer, Dr. W. P. Tew; Editorial Board of the Harvey Club Bulletin for three years, Dr. H. O. Foucar; Sick Committee, Dr. W. E. Bateson; Entertainment Committee, Dr. F. W. Hughes. It was decided to continue the Harvey Club Scholarship of \$100 to the student doing original investigations at the University of Western Ontario Medical School.

At a meeting of the Lambton County Medical Society held at Sarnia on March 17th, Dr. R. I. Harris of Toronto gave an address on "Tuberculosis of the bones and joints," illustrated by lantern slides.

The Porcupine District Medical Society met at Timmins on March 19th, when Dr. C. S. Wright of Toronto gave a talk on "Some explanations of low back pain with consideration of sacro-lumbar and sacro-iliac lesions," illustrated by lantern slides. The lecture, a very interesting one, was repeated before the Niagara District Medical Association on April 6th.

On March 25th, Dr. G. A. McLarty of Toronto addressed the Brant County Medical Society at Brantford, his subject being, "The examination of a neurological case."

Professor V. J. Harding of the University of Toronto addressed a meeting of the North Waterloo Medical Society at Kitchener on March 26th, on the subject, "Metabolism in pregnancy and its relation to the toxæmias."

At a meeting of the South Waterloo Medical Society held at Galt on March 31st, the following addresses were given: Dr. A. J. Grant, Western University Medical School, London, "Neoplasms of the female breast, differential diagnosis and treatment"; Dr. W. P. Tew, also of Western University Medical School, "The use and abuse of forceps."

Dr. Roscoe Graham of Toronto addressed the Lincoln County Medical Society at St. Catharines on April 7th, on the subject, "Surgical emergencies in the gastro-intestinal tract."

The Harvey Club of London celebrated the com-

pletion of the sixty-seventh anniversary by a banquet on Friday evening, February the 19th, to which we have elsewhere referred.

The new Presbyterian Hospital at South Porcupine was dedicated and formally opened in February. The

entire cost of the building and equipment has been met by the Women's Missionary Society of the Presbyterian Church in Canada. The hospital was opened at the request of the municipality and has accommodation at present for eight beds. It has a well equipped operating room and sterilizing outfit. N. B. GWYN

## MANITOBA

The twenty room junior high school now in process of erection on Wolseley Avenue, Winnipeg, has been named the Gordon Bell School, after the late Dr. Gordon Bell.

The chairman of the Board of Trustees of the Winnipeg General Hospital announces the appointment of Miss Jessie Grant, R.N., as superintendent of nurses at that institution. Miss Grant is a Nova Scotian by birth, took her nursing training in the Massachusetts General Hospital, Boston, and has occupied a number of responsible positions in Canadian and United States hospitals since. She comes to Winnipeg from the Illinois Training School for Nurses, Chicago, where she has been educational director for the past three years. It was largely on account of Miss Grant's outstanding qualifications as a nursing educationist that this selection was made by the board of trustees.

On April 9th, the Winnipeg General Hospital had 655 patients within its walls. This constitutes a record for this institution, the rated number of beds being 600.

The Brandon and District Medical Association held a meeting at the Brandon Mental Hospital on

March 25. Dr. D. A. Stewart gave an address on "Non-tuberculous septic conditions of the chest." He presented a series of forty cases, divided as follows: fourteen infected teeth and mouth, nine following tooth extraction and ordinary operations, seventeen following acute infections. X-rays were shown to illustrate each case.

Sir Henry Gauvain is to be one of the speakers at the annual meeting of the Manitoba Medical Association.

The Secretary of the North Dakota State Medical Association announces to the medical men of Manitoba that the State meeting is to be held at Minot, N.D., on May 25th and 26th and cordially invites men from this side of the line.

Dr. T. H. Johnson has left Winnipeg for British Honduras where he has accepted a six months appointment under the British Colonial Office.

Dr. Barnes, Superintendent of the Selkirk Mental Hospital has kindly arranged a clinical meeting at that institution where the members of the Winnipeg Medical Society will be his guests. R. B. MITCHELL

## SASKATCHEWAN

A meeting of the Regina District Medical Society was held on March 17th, at the General Hospital, Regina. Thirty-five members were present. Several interesting clinical cases were presented, and also a very instructive paper was read by Dr. Garneau on the evolution of diet. A very interesting and lively discussion followed the reading of the paper. The relationship between modern diet and cancer was discussed very thoroughly by a large number of those present.

Dr. F. H. Coppoch, a graduate from University of Manitoba 1925, has opened an office at Rosthern, having taken over the practice of the late Dr. A. B. Stewart.

Dr. R. McKinnon, who has been practising for several years at Margo, has now opened an office at Scotsguard.

Arrangements are being made for a tour under the post-graduate extension course in the Province of Saskatchewan during the month of June. The team will be composed of three men, one each from the Medical Faculty of Dalhousie University, Queen's University and the University of Western Ontario. Meetings will be held at Yorkton, Saskatoon, North Battleford, Prince Albert, Regina, Moose Jaw, Weyburn and Swift Current. It is expected that a second team will make a tour of the province probably in the month of July. All medical men are urged to attend these

courses. Every effort will be made to have them as practical as possible. In order to obtain the best results, it is necessary to have the co-operation of all the medical men in each district. A. MACG. YOUNG

Dr. J. C. Black of Regina spent a few days in the Mayo Clinic, Rochester and in Chicago.

Dr. Ferguson of the Qu'Appelle Sanatorium, has the work well under way of the national scheme to determine the relative frequency of the bovine and human tuberculosis bacillus as the cause of tuberculosis in humans in this province. The work has been started amongst the Indians.

Dr. Hugh McLean of Regina left last month with the Inter-State Post-Graduate Society on their visit to the European centres.

A circumstance arose the other day in Regina which brings to mind the fact that we have an act requiring registration of chiropractors and osteopaths. A man came into town, registered at an hotel, and requested the proprietor to send him to Weyburn Asylum; later he went to see a drugless practitioner, took treatment, and went back to the hotel and cut his throat. A surgeon was called in and managed to save his life.

We have six or seven drugless practitioners in Regina and only 25 per cent of these are registered. The one in this particular case is not registered.

R. MCALLISTER

**ALBERTA**

The first meeting of the post-graduate course put on by the Canadian Medical Association in conjunction with the Alberta Medical Association, was held at the University of Alberta Medical building at Edmonton on March 22nd, and was attended by 150 medical men. Dr. William Boyd of Manitoba University spoke on "Valvular Disease of the Heart", and Dr. Herbert Galloway of Winnipeg on "Details in the treatment of some common fractures". Both lectures were illustrated with lantern slides and were of great value and interest to the medical men present, a number of whom came in to the city from outlying districts to attend the meeting.

Dr. and Mrs. A. F. Anderson of Edmonton lost their only daughter from acute appendicitis on March 27th. Miss Anderson was a brilliant and popular student of Alberta University and was to have graduated this spring. Her untimely death has cast a gloom over the whole community, and the sincere sympathy of the medical profession generally is being extended to the parents in their sad and sudden bereavement.

T. H. WHITELAW

Dr. Foster S. Murray is now practising in Athabasca. Dr. Henri L'Asnier, formerly of St. Paul, Alberta, has removed to Altario.

Dr. E. S. Sarvis has disposed of his practice to Dr. Hector McKenzie and is now Superintendent of the United Church Hospital at Smoky Lake.

Dr. A. B. Singleton of Calgary has returned home after an enjoyable trip to Honolulu much improved in health.

Dr. J. E. Mason, who for a number of years practised in Hanna, has settled in Stettler.

Dr. Graham Huckell, formerly Medical Officer with the Provincial Department of Health, is now practising at Waskatenau, Alberta.

Dr. W. W. Cross, formerly of Youngstown, has settled in Hanna.

Dr. J. T. Shillabeer of Nordegg has sold his practice and is now taking post-graduate work. He will return to Alberta to practise.

The annual general meeting of the Calgary Medical Society was held at the Holy Cross Hospital on April 6th. The President, Dr. E. R. Selby, D.S.O., addressed the members on the subject of "Observations on commonplace things in medical practice." The election of officers for 1926-27 resulted in the following being elected, viz: President, Dr. R. O'Callaghan; Vice-President, Dr. A. I. McCalla; Secretary, Dr. D. R. Dunlop; Treasurer, Dr. W. W. Upton; Executive Committee, Drs. J. Palmer; J. Reid; J. D. Stewart.

On the evening of March 23rd eighty members of the medical profession attended the first of the series of post-graduate lectures held under the grant of the Sun Life Assurance Company to the Canadian Medical Association. The ballroom of the Palliser Hotel, Calgary, was utilized on this occasion. The lecturers of the evening were Professor Herbert Galloway and Professor William Boyd, both of Manitoba University. Professor Galloway took as the subject of his discourse "Details in the treatment of some common fractures" and dwelt at length upon fractures about the elbow joint, and fractures of the neck and head of the femur. In the treatment of fractures about the elbow joint Dr.

Galloway stated that he followed the methods of Sir Robert Jones of placing the forearm in the acutely flexed position following a reduction of the fragments. Reduction should be attained without the use of much force and by means of (1) extension of the forearm; (2) supination of the forearm; (3) then placing the forearm in an acutely flexed position, this being retained by a plaster of paris dressing, which should be left on for two or three weeks. The circulation should be carefully watched, and if obstructed, the arm should be let down a few degrees then returned to the acutely flexed position when the circulation has improved. After removal of the retentive dressing the forearm is left at an angle of 70 degrees and hung from the neck by a sling so that the patient may engage in voluntary movements.

In the treatment of fracture of the neck of the femur this is usually perfunctory because the prognosis is bad, but the prognosis is bad because the treatment is perfunctory. The mortality is fairly high. The age of the patient has much to do with the eventual outcome and the mortality is much less in the comparatively young than in those over sixty years of age. Professor Galloway considered the Whitman "abduction method", the ideal one. Impacted fractures should not be disimpacted, else serious trouble will follow if any other than Whitman's method is followed. One may disimpact without fear when the Whitman treatment is to be carried out, since after abduction of the femur the fragments will lie against the acetabulum and the trochanter against the side of the pelvis. To obtain the best results with the abduction method powerful traction should be made on both lower limbs, then rotate both limbs inwards, and following this both limbs should be abducted to an extreme limit. The plaster of paris dressing is then applied about the pelvis and the fractured limb.

Professor Galloway's lecture was illustrated by numerous lantern slides and great interest was manifested by those present. General practitioners are at times confronted by these different types of fracture which often give much concern as to the functional outcome.

Professor Boyd spoke of "Valvular disease of the heart" with special reference to the newer concepts of the pathology of this subject. He remarked that the question of organic heart disease was the outstanding problem in medicine to-day. He dealt especially with the rôles played by (1) rheumatic fever; (2) syphilis; and (3) bacteria in the production of endocarditis. Rheumatic fever is the most common cause of endocarditis. The joints, subcutaneous tissues, serous surfaces are involved as well as the myocardium, pericardium and aorta. We now regard the disease as an indwelling infection. Rheumatic endocarditis is a definite indication of rheumatic infection. One of the special lesions in rheumatic fever is the Aschoff body nodule which is really a circlet of cells, and is found in the endocardium, the myocardium and pericardium, and in the aorta. Extensive scar formation follows in the wake of these nodules, so that the aorta may be permanently weakened. Rheumatic fever tends to produce a mitral stenosis or an incompetence, dilation of the aorta, and adhesive pericarditis.

*Bacterial endocarditis.* Professor Boyd referred to the work of Dr. Carey Coombs on endocarditis. A recent paper by him has shown that this type may be acute or subacute and caused by hemolytic streptococci, staphylococci or gonococci. The acute form may be but an incident during the course of septicemia following a boil or a carbuncle. The subacute form of endocarditis is the more common and may run its course in from three to four months to two or three years. The *streptococcus viridans* is the usual infecting micro-

organism arising from an apparently quiescent focus of infection. The bacillus of influenza may also produce the disease. The prognosis is grave in both these forms of endocarditis and the disease proceeds remorselessly to its ultimate conclusion. Libman states that occasionally we come across mild cases, and Graham, Oille and Detwiler report an epidemic in Toronto of mild cases in which a number recovered, but with permanently damaged valves. Why does the *streptococcus viridans* settle in the valves and not on the valves? Bacteria reach the valves by any of the capillaries to the valves. In early life the capillaries disappear as a rule, but persist in some valves. The mitral valve capillaries are the last to go, hence we so often see mitral valve involvement in the young. Rheumatic endocarditis is a true valvulitis. Professor Boyd then referred to the work of Louis Gross on the blood supply of the heart. Lewis of London has shown that there is sometimes present in the aorta a superadded bicuspid condition, which is an anomaly denoting the persistence of the fetal vasculature.

Professor Boyd's lecture was graphically illustrated by numerous slides of microscopic sections showing various lesions of the cardiac valves and of the myocardium, and of the aorta. A new conception was

obtained of cardiac pathology by those who were fortunate enough to be present at this interesting lecture.

At the recent session of the Alberta Legislature the "Act Respecting the Medical Profession" was amended so as to prohibit medical men from terming themselves "specialists" without having received from the Registrar of the University of Alberta a certificate of having complied with such requirements as to qualifications and fitness, as may be prescribed by the Senate of the said University.

Another amendment was made similar to others in the medical acts of other provinces in regard to religious organizations as follows: Nothing in this Act contained shall apply to or affect those who practise the religious tenets of their church without pretending to a knowledge of medicine or surgery; provided that the laws, rules and regulations relating to contagious diseases and sanitary matters are not violated.

The Professions Discipline Act, concerning which considerable has been said in earlier numbers of the *Journal* of this year, was adjourned on the second reading, to be dealt with at the next session of the Legislature after the July provincial elections.

G. F. LEARMONTH

## BRITISH COLUMBIA

Dr. H. N. Watson of Duncan, Vancouver Island, has been confined to bed for a few days with influenza, and is at present recuperating in Vancouver, meeting many old friends. His practice is being cared for by Dr. G. A. Petrie.

We are pleased to state that Dr. Harry Milburn, Past President of the Vancouver Medical Association, who has been suffering from severe sinus affection for some weeks, has now quite recovered and resumed practice.

Dr. John A. Stewart of Victoria, B.C. has just returned from a motor trip to California. He looks well after a deserved holiday and needed rest.

A meeting of the Executive Committee of the B.C. Medical Association was held on the 24th instant, when quite a number of important economic problems were dealt with. In addition to the local members, District Medical Societies were represented by Dr. M. J. Keys, Victoria; Dr. T. J. McPhee, Nanaimo; Dr. H. H. Murphy (President) and Dr. M. G. Archibald, Kamloops; Dr. F. W. Andrew, Summerland; Dr. E. J. Rothwell and Dr. W. A. Clarke, New Westminster. Nineteen doctors were elected to membership. Reports from Dr. Neil M. McNeill (Chairman of the Publicity and Educational Committee) and Dr. T. H. Lennie, (Chairman of the Industrial Service Committee) indicated a tremendous amount of good work accomplished during the past few months by their respective committees.

The annual meeting of the B.C. Medical Association will be held at the Empress Hotel, Victoria, B.C., on Tuesday, June 22, 1926.

A recent trip up the coast as far north as Anyox and Stewart, resulted in the Executive Secretary collecting 100 per cent of the membership fees from the doctors visited.

Dr. E. D. Carder, who was chosen to deliver the Osler Lecture for the Vancouver Medical Association

for 1926, took the Thymus for his subject. The lecture is published in full in the April number of the Vancouver Medical Association Bulletin.

Under the auspices of the Canadian Medical Association, an extra-mural post-graduate tour throughout British Columbia, is being arranged for next September. Tentative programme has been submitted to Dr. T. C. Routley, and it is hoped the itinerary will, in addition to the Vancouver Summer School, include Victoria, Nanaimo, Prince Rupert, Prince George, Kamloops, Penticton, Nelson and Cranbrook.

A well attended luncheon meeting of the B.C. Medical Association was held on March 25th when Dr. Forrest Leeder, in a witty and humorous address, gave some interesting facts relative to the value of efficient organization in Medicine. We had with us as guests Dr. Wm. Boyd and Dr. H. P. H. Galloway of Winnipeg.

The first meeting to be held in Vancouver under the Extra-Mural Post-Graduate Committee of the Canadian Medical Association, was held on the 25th of March, when the members of the Vancouver Medical Association had the pleasure of hearing lectures by Dr. Wm. Boyd and Dr. H. P. H. Galloway, of Winnipeg. Over a hundred men attended and on all sides the action of the Sun Life Insurance Company in making such a meeting possible was gratefully commented on.

The Canadian Medical Night was a marked success in Victoria, B.C. The members of the Victoria Medical Society, all of whom by the way, are also members of the Canadian Medical Association, met at the Banquet Board at the Empress Hotel on Friday, March 26, 1926 and were delighted to honour their guests of that day, Doctors Galloway and Boyd of Winnipeg. The large attendance of members was worthy of the occasion and both these gentlemen left Victoria with warmly appreciative friends, and the gratitude of the profession to them both for their

splendid addresses, as well as to those who had made their visit possible. The President of the Victoria Medical Society presided.

Dr. Galloway dealt with "Some details of treatment of some common fractures" and covered very fully and forcibly the fractures of the elbow and the neck of the femur. Lantern slides of excellent quality added clarity and impressed the important points. Dr. Boyd's address on "Valvular disease of the heart" left a strong impression on the minds of his audience on the necessity of rest in this affection. When Victoria members deal with fractures and the damaged rheumatic heart they will recall the statements made by both speakers and secure efficient rest in both conditions. The bed is a splint which has been too infrequently used and too briefly applied for the full reconstruction of a damaged heart. Dr. Boyd showed some lantern slides which were most instructive. Dr. George Hall expressed the thanks of those present for one of the best meetings Victoria has been

privileged to hold. Dr. Maxwell of Ladysmith; Dr. Swan and Dr. Garner of Duncan; and Dr. Mostyn-Hoops of Deep Cove came to Victoria for the meeting from the various centres in the southern part of Vancouver Island. Almost every member of the profession in the city was present. The success of this meeting should cheer those responsible and Victoria awaits the next announcement of a Canadian Medical Night.

The Vancouver General Hospital Laboratories are obtaining the views of the medical men in the city as to the expediency of substituting the Kahn for the Wassermann Test for syphilis after a transition period during which both tests will be made. Miss M. Malcolm, Serologist of the Vancouver General Hospital Laboratories, was the first to draw attention, in Canadian medical literature, to the close correspondence of the two tests in a paper presented before the Canadian Public Health Association at Edmonton in June, 1923.

## Book Reviews

**Sir William Osler Memorial Volume.** Appreciations and Reminiscences. Representing Bulletin No. IX. of the International Association of Medical Museums and Journal of Technical Methods. Managing Editor: Maude E. Abbott. 670 pp. with 102 illustrations. Subscription price \$10.00. Privately issued at 836 University St., Montreal, Canada, 1926.

The appearance of this large volume constitutes another landmark in the already long series of tributes to one of the most outstanding figures in modern medicine. There is no question that within the past century no one, with the exception of Pasteur, made a more definite appeal to both the professional and the public imagination than did Sir William Osler. On the one hand Pasteur compelled attention because of the magnitude of his services to mankind; his discovery of the relation of bacteria to the causation of disease and the resulting development of protective inoculation saved millions of lives, to say nothing of the monetary value of his other results. On the other hand, Sir William's renown rests not so much on any great discovery as upon his many and varied observations in the field of medical knowledge, and upon the art and clarity with which these observations were presented. The contents of the present volume also emphasize the fact that much of his fame is a tribute to his personality, his power of interesting others, of stimulating clinical research, and of removing the animosities of discordant factions. To have friends a man must show himself friendly, and few have succeeded to a greater degree in the art of friendship.

There are over 100 contributors to the volume and it speaks well for the care of the Editorial Committee that there is so little overlapping. Certain of the articles contain rather humorous complaints which suggest a somewhat ruthless insistence on the part of the editors, but this is only to be expected. The task of keeping this small army of writers in reasonable array must have been a stupendous one.

The contributions are divided into four groups. First: Introductory Notes and Editorials in which figure the names of Welch, Allbutt, Warthin, Keith, Pierre Marie and Sudhoff. Then General Articles, amongst others by Garrison, Sims Woodhead, McCrae, Martin, Cole, Adami, Cattell and Chipman. These two groups occupy the first 108 pages. The third group is com-

posed of a series of Biographical Sketches, arranged in the five periods of Osler's life; the Early Years, the Montreal Period, the Philadelphia and the Baltimore Periods, and lastly the fourteen years at Oxford. These sketches cover 342 pages. It were an idle task to single out any one of these for particular mention; each depicts some phase of the Chief's life which specially impressed the writer, and the result is a wealth of material, of detail, of critical judgment, which we must look far to equal. All show a certain strain of hero worship, but nowhere does this pass beyond the most conservative bounds. In many ways the material is complementary to that in Cushing's Life, and the book affords a more intimate study of the gradual development of the great physician than is possible in the formal biography.

*In Memoriam* is the title of the next section and covers with many illustrations the various commemoration tablets, etc., erected in his honour, including the special rooms prepared for the reception of the Bibliotheca Osleriana at McGill, while Elliott's description of the Johnson cabinets preserved at the Toronto Academy of Medicine, forms a pleasing addition to the Osler material already presented.

The *Magnum Opus* however, is undoubtedly the Classified and Annotated Bibliography of the Publications of Sir William Osler, Bart., F.R.S., etc., compiled and augmented by Maude E. Abbott, E. B. Krumbhaar, M. W. Blogg, and Archibald Malloch, and edited by Fielding H. Garrison and Henry W. Cattell. This requires 133 closely printed pages. The titles are arranged in bibliographic form under the four different periods of Osler's academic life, and grouped by years under seven heads or rubrics: Natural Science, Pathology, Clinical Medicine, Literary Papers, Medical Education, Public Welfare and Volumes Edited.

Welch states in the Foreword that there has been a noticeable lack in the many writings about Osler of any adequate critical estimate of the extent and value of his actual contributions to knowledge. This compilation is a noteworthy step toward the filling of this gap. The bibliography also has a marked value as a work of reference. While it is notorious that Osler had certain pet subjects, still his interests were so wide that there were very few branches of medicine to which he did not turn his pen during some period of his career.

The bibliography should serve therefore, as a useful point of departure for a rapid survey of the literature on a comparatively large range of topics.

The book is well printed, the type pleasing, the illustrations are of good definition and many of them new. There is the editor's usual full table of contents and the proof reading is excellent. It is a book to be commended as reflecting credit on those capable of gathering from such a wide-flung field, so uniform and excellent a harvest.

D. S. LEWIS

**Public Health Law.** James A. Tobey, M.S., LL.B. 304 pages. Price \$4.50. Williams & Wilkins, Baltimore, 1926.

This is a useful book for health officers and those holding health appointments of an executive nature. The ordinary health officer enters upon his work knowing very little about law or court procedure.

The book is written in a concise and simple manner and will prove an excellent guide to all those public health workers who have to interpret and apply public health laws and prepare health legislation.

There are many things that arrest the attention in perusing this work. Dr. Tobey states that the consensus of opinion among sanitarians is that an executive health officer with an advisory council is the most desirable executive authority in state health matters. In reference to the administration of school health activities Dr. Tobey thinks they should be placed either under the department of health or under the board of education; either system will work satisfactorily if the importance of these activities is recognized. He thinks the requirement that a health officer should be a practitioner of medicine is unnecessarily narrow—that an individual with a "Dr. P. H." is much more logically trained to administer a health department than is a physician with no public health training or experience.

It is interesting to note the minor position now occupied by nuisances, once so important to the health officer. When the first law book on public health was printed in the United States, one hundred pages were devoted to this subject, while in the book under review it receives less than twelve.

Dr. Tobey suggests that health legislation be prepared jointly by a sanitarian, a professor of English and a lawyer.

This book while naturally of much greater value to those interested in public health work in the United States, is also a handy reference for those employed in the public health services in Canada.

R. ST. J. MACDONALD

**Venereal Diseases.** Catechism series. Chas. Averill, M.A., B.Sc., M.D., D.P.H. 88 pages. Price 50c. E. & S. Livingstone, Edinburgh. The Macmillan Co. of Canada, Toronto, 1926.

Probably no branch of medicine has been so deplorably neglected, perhaps no group of patients has been subjected more to the vicissitudes of experimental practices than has venereal disease and those suffering from it. The unflattering reference to the "Clap Doctor" perhaps sums up the situation. We have in Dr. Averill's pamphlet on venereal disease published by the Macmillan Company of Toronto, a concise, simple and above all a readily accessible presentation of the venereal problem. The catechism method has a very forceful way to drive home the salient features. Were I to criticize I might take exception to Dr. Averill's treatment in primary syphilis with a negative Wassermann. From our experience in the clinic of the Montreal General Hospital and elsewhere one intensive course as outlined, with a recommendation to repeat this is insufficient, in many of the cases. Too often do we see recurrence after such limited treatment.

No test at our disposal has given such far reach-

ing results, as has the Wassermann reaction, and yet no test has brought about such appalling fatalities from its misinterpretation. I would particularly call attention to the questionnaire on this reaction. Too much attention cannot be paid to the chronic prostatic vesiculitis. In the discussion of epididymitis attention is not sufficiently given to the prostate, which invariably is infected with the vesicles. To the undergraduate and to the general practitioner Dr. Averill has filled a long felt want.

R. E. POWELL

**Psychological Healing. A Historical and Clinical Study.** By Pierre Janet, Professor of Psychology at the College of France. Translated from the French by Eden and Cedar Paul. 2 vols., 8vo. 1265 pages. Price \$15.50. The Macmillan Company, New York and Toronto, 1925.

Pierre Janet has given to the medical world a most useful text-book on psychological methods of healing of which a very readable translation into English has been made by Eden and Cedar Paul. A large part of the work is devoted to a historical survey commencing with the temple sleep of the time of Hippocrates down to the latest vagary of the New Thought cult. In a young science this is a very valuable method. Emphasis is laid upon the work of Mesmer, the schools of Nancy and the Salpetrière and the extraordinary movement inaugurated by Mary Baker Glover Patterson Eddy. Janet's remarks on the Christian Science movement are especially interesting, and he devotes to this topic the attention which the phenomenal growth of this cult demands.

Psychoanalysis as understood and practiced by Sigmund Freud and his school receives some caustic criticism. Nowadays it requires no little moral courage in a psychologist to disparage the Freudian psychology. Any adverse criticism is met with the rejoinder that the critic himself must be a neuropath with repressed sexual complexes. It is refreshing to read a sane account of the rôle of sex in abnormal mental states. From the standpoint of the general practitioner the great value of the book consists in the large number of case reports with the treatment for each individual case.

The various psychological therapeutic measures are explained in a way that should be of great assistance to the busy physician who has neither the time nor inclination to plow through the vast literature on abnormal psychology.

A comprehensive bibliography and a complete index add to the usefulness of the book.

Altogether, this work by the celebrated professor of psychology at the College de France fills fairly adequately the need for a concise account of mental therapeutics.

J. H. ELLIOTT

**Muscular Activity.** Archibald Vivian Hill, D.Sc., F.R.S. 115 pages, 47 charts. Price \$2.75. Williams & Wilkins, Baltimore, 1926.

This book consists of four lectures in which the author summarizes some of the newer researches into the nature of muscular activity. The subject is considered under four headings:

1. Dynamics of muscular activity
2. Heat production of muscle
3. Chemical changes accompanying muscular action
4. Recovery processes after exercise.

This book is of a highly technical character, is well supplied with diagrams and contains a large bibliography at the end of each chapter. Former investigations have been mostly for the purpose of determining the mechanical effects and end results of muscular action and the author attempts to explain how some of these are brought about. It was found that muscle should not be regarded as a perfect elastic structure, and that much muscle force is lost through internal friction and viscosity. The action

of muscle may be likened to a thin ribbon tube filled with some viscous or gelatinous material which forms during contraction—the degree of viscosity being proportionate to the amount of contraction or stimulation and lactic acid production.

Comparative tests for work done under varying conditions of speed by a specially constructed balance wheel showed that economy of effort could best be maintained by slower contractions, and that greater stimulation of muscle causes a kind of coagulation of the muscle plasm through the production of lactic acid. In the measurement of heat production many technical difficulties were encountered. For the very delicate and sensitive tests a thermopile was used—the readings being made by photography which measured the galvanometer deflections. The advantage of these tests being that observation of events were made when they actually occurred. The observations were made on the sartorius of the frog and on healthy human subjects of the athletic type. The results obtained in the two were very similar, which, as the author points out, shows that life is consistent.

The study of recovery processes after exercise is of particular interest. Measurements of oxygen consumption were carried out by an ingenious arrangement. The subject carried a Douglas bag which received the expired air during various exercises, as walking, running, bicycling etc.

The author relates that at the close of one of his lectures in Holland it was remarked that it was "typical of an Englishman that when he found an interesting bit of physiology, immediately to want to apply it to sport."

While the new facts contained in the book are few, one cannot expect otherwise in such a difficult subject. To the student interested in the physiology of exercise the book is particularly instructive.

F. W. HARVEY

**Medical Heredity.** Distinguished Children of Physicians (United States, to 1910) by William Browning, Ph.B., M.D. Pp xii + 250. Price \$4.00. Baltimore, The Norman Remington Company, 1925.

This is announced as a study in the intellectual tendencies of medical training and descent. Dr. Browning has made use of his opportunity as librarian of the Long Island Medical Society to complete a list of some 6,500 names of sons and daughters of physicians who have become distinguished in various lines of life and effort outside of medicine. In the classified schedule appear the names, with date of birth and death, profession, outstanding positions held, and medical parentage. There are fifteen headings beside sub-headings, Fine Arts, Industries, Commerce, Sociology, Education, Literature, Journalism, Theology, Public Life, Military, Adventure, Public Medicine, Engineering and Science. There is a review and commentary. While addressed principally to the physician it is expected to attract the attention of the biologist, eugenist, sociologist and vocational guide. The work is new in design, in method and material. The numbers dealt with are perhaps too few from which to draw many conclusions as to the effects of medical heredity. Yet the author feels he may draw certain deductions. He observes the effect of a high order of training on the upward development of social stock and the book may be considered in some respects a study of the basis of success. It is perhaps difficult to differentiate between the influences of medical heredity, medical care and of medical environment with all their influences toward a higher development.

To the medical historian there is much of value. The relatives of physicians will be interested, and the author suggests that as the stimulation of laudable gossip is a noble art this may be considered as perhaps

one of the chief aims of the book. In one of the appendices there are listed a number of instances of long lines of continuous medical descent of five, six, seven and eight consecutive generations of physicians.

J. H. ELLIOTT

**Intravenous Therapy.** Walton Forest Dutton, M.D. Second edition. 594 pages, illustrated. Price \$6.00 net. F. A. Davis Co., Philadelphia, 1925.

The former edition was noticed in this *Journal*, vol. xiv, page 1254. The Jansky classification in blood grouping which was prominent by its absence appears in this recent edition. The modern work of L. Bruce Robertson in exsanguination transfusion is not noted. Some new matter has been added with slight increase in the size of the volume. In the portion of the volume devoted to therapy much that has appeared in the recent literature has been added, though with but little critical comment. The list of intravenous medications under the headings yellow fever, syphilis and typhus read rather like a pharmaceutical catalogue. The author has endeavored to include practically all that is known on intravenous technique and to record all medicinal substances which have been advocated in intravenous therapy.

J. H. ELLIOTT

**Nephritis.** Herman Elwyn, M.D. 347 pages, illustrated. Price \$5.50. The Macmillan Company of Canada, Toronto, 1926.

The author has attempted to collect, correlate and condense into book form something of what is known of nephritis at the present time. It is essentially presentation of the subject from the German point of view. Following the dedication to Franz Vollard (a pleasing tribute), we find references in large part to German writers. For an example, out of 130 references in Chapters XV-XVIII, 95 are to German literature.

As medicine has no geographical boundaries, it is extremely valuable to have the German workers so largely quoted but one wonders why so little attention comparatively is paid to the English, French and American writers in the same field, unless it is that the object of the book is to present mainly the German conception of nephritis, especially that of Volhard and Fahr whose classification has been so widely adopted.

One wonders, too, why, in a work of this scope, no attention is given to the history of this disease and only a passing reference is made to that pioneer worker in this particular field—John Bright.

Why on page 53 does the author use the expression "the Englishman Wilson", when workers in all the other countries are not similarly designated?

As this work is devoted to nephritis it is not easily understood why pyelitis, or better, pyelonephritis, is not dealt with especially as nephrosis and arteriosclerosis are so comprehensively described.

Since heredity plays so large a factor in benign hypertension, and renal arteriosclerosis (the latter apparently in the author's mind the cause of the former), a word as to prevention of this condition through care in marriage might well have been urged through the good offices of the family physician.

The chapter on the "Kidney of Pregnancy" should prove useful to the practitioner doing obstetrics, especially the part dealing with rising blood pressure as an indication of oncoming convulsions and the theory in regard to the latter. This should stimulate those concerned to a more frequent use of the sphygmomanometer.

The reviewer has found this book intensely interesting and helpful and can unhesitatingly recommend it to any student of medicine, graduate or undergraduate. In the different sections devoted particularly to the different forms of nephritis, the physiology, pathological physiology, etiology, pathogenesis, symptoms, diagnosis (with

function tests in detail), prognosis and treatment are so clearly dealt with that one comes away from each section stimulated, refreshed and enlightened.

HARRIS MCPHEDRAN

**Intestinal Tuberculosis.** Lawrason Brown, M.D., and Homer L. Sampson. 304 pages, 112 engravings. Price \$4.00. Messrs. Lea & Febiger, Philadelphia, 1926.

In a foreword Dr. Walter B. James announces this volume as the first of a series which may appear recording the results of medical research at the Trudeau Sanatorium. From the laboratory and sanatorium founded by Dr. E. L. Trudeau there have appeared many important studies in tuberculosis. Of recent publications the one which perhaps marked the greatest progress in diagnosis was that of Brown and Sampson in 1919 on "Early Roentgen Diagnosis of Ulcerative Tuberculous Colitis." Further work by these authors and their associates has resulted in the publication of the present volume. For many years intestinal tuberculosis has been known as a serious and frequent complication of advanced pulmonary tuberculosis. Louis, one hundred years ago found it present in about five-sixths of a large series of cases examined at autopsy. Frequently, it is present without definite symptoms. Even with symptoms of indigestion, and with diarrhoea present in advanced cases it has in the past not always been possible to say that the symptoms were due to tuberculous disease of the bowel.

Intestinal tuberculosis must always be regarded as a serious complication of pulmonary tuberculosis. The onset of gastro-intestinal disturbances often marks a serious change in the condition of the pulmonary invalid. If due to unrecognized intestinal tuberculosis it may mark the beginning of the end. Hitherto it has been impossible in many cases to differentiate between tuberculous and non-tuberculous disease of the bowel. In many others, the patient with pulmonary tuberculosis who has been doing well, has become so ill through an unsuspected intestinal tuberculosis as to have lost all chances of recovery before the diagnosis of this complication is made.

Next to open air and rest the sanatorium physician relies on diet and good digestion as the mainstay of the pulmonary patient in his progress to cure. In a disease where medication plays such a relatively unimportant part in restoring and maintaining the nutrition of the patient, Detweiler in the 90's referred to his kitchen as his dispensary. A reliable method of the early diagnosis of such a severe complication as intestinal tuberculosis marks a great advance, and with the proof that this complication is amenable to treatment in a large proportion of cases, its early recognition will materially improve the prognosis in pulmonary tuberculosis.

In a routine study of 361 cases admitted to the Trudeau Sanatorium, eighteen were found to have intestinal tuberculosis. A higher proportion will be found in sanatoriums where a greater proportion of advanced cases are admitted. "Suggestive symptoms of beginning intestinal tuberculosis include, among others, any digestive disturbances, marked constipation, failure of the pulmonary condition to improve, irregular temperature with subnormal fluctuations, a decrease of pulmonary symptoms even when the patient is evidently not doing well, alternating constipation and diarrhoea, and marked nervousness." The x-ray findings on which diagnosis depends are; "General hypermotility, with complete or nearly complete emptying of the colon in twenty-four hours; failure of the cæcum or of the ascending colon and hepatic flexure to retain the barium; the presence of spasm or filling-defects (irregular contour, lack of haustrations); or of confirmed segmentation, with or without dilation of some coils of the small bowel; ileal stasis;

and gastric retention, form the essential points when the intestine is studied at the third to the tenth hours, and again at the twenty-fourth hour. These findings indicate ulceration only, but when pulmonary tuberculosis is present, tuberculous ulceration can be safely diagnosed."

Those who have followed the work of Brown and Sampson and those who have used their technique will agree with their conclusions that: "No moderately or far-advanced case of pulmonary tuberculosis can be assumed to have been thoroughly examined unless a roentgen-ray study of the bowel has been made." And; "This is the only method which will diagnose intestinal tuberculosis in its incipiency or exclude it at any stage." Medicinal therapy, surgical therapy and light therapy are discussed. Ultraviolet rays and heliotherapy frequently relieve symptoms and bring about recovery.

The monograph is a most attractive and valuable one. There is a full presentation of the important literature of intestinal tuberculosis; the anatomy of the intestines, their physiological movement, the pathological changes in tuberculosis, the site of the lesions, the clinical symptoms, and clinical, laboratory and radiological methods of diagnosis receive full and ample discussion. Prognosis, prophylaxis, and treatment are likewise dealt with. The bibliography of over twenty pages adds materially to the value of a well presented study. The authors are to be congratulated on their presentation of a valuable addition to our methods of diagnosis. J. H. ELLIOTT

**Manual of Determinative Bacteriology.** David H. Bergey, M.D. Second edition. 450 pages. Price \$5.50. The Williams & Wilkins Company, Baltimore, 1925.

This book first appeared in 1923 and is now followed by the second edition. The author assisted by a committee from the Society of the American Bacteriologists has put into book form a classification of Schizomycetes classified in accordance with the bacteriological code adopted by the society. In the preface of the first edition there is a hope expressed "that this manual will serve to stimulate efforts to perfect the classification of bacteria, especially by emphasizing the valuable features as well as the weaker points in the new system which the committee of the Society of American Bacteriologists has promulgated."

The introduction contains in twenty-two pages, a brief review of previous classifications. The new system of classification is based on both morphologic and biologic characters and under each order, family, tribe, etc., appears, stated as briefly as possible, the essential morphological and biological characteristics of every species which receives the name assigned to it by the American Society of Bacteriologists; beneath appears a list of synonyms as well as the accepted facts, morphological and biological, briefly stated, pertaining to this particular species. An excellent index provides an easy means of looking up any organism, a task not so readily performed in the previous edition.

This book deserves the patronage of all those engaged in bacteriological work. Those who had to do with its compilation make no claims for perfection, yet all fair minded readers will recognize that it represents an advance, and an able attempt to bring clarity to the chaotic condition that has existed in bacteriological classification.

JOHN JAMES OWEN

**Ultra-Violet Radiation and Actinotherapy.** Eleanor H. Russell, M.D., B.S., and W. Kerr Russell, M.D., B.S. 262 pages, illustrated. Price \$3.25. E. & S. Livingstone, Edinburgh. The Macmillan Co. of Canada, Toronto, 1925.

The above named book briefly sets forth the views of the authors regarding the uses of the ultra-violet rays. In the preface they at once state that

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they do not claim this form of treatment to be a cure-all, but desire to demonstrate that the ultra-violet rays have a definite place in the field of treatment. Also, that many cases will respond more quickly to this type of treatment than to any other, and in some cases relief or even cure can be obtained when other treatments have failed. Throughout the book this conservative attitude has been maintained, although perhaps enthusiasm is in the ascendency occasionally.

The first half of the book has been taken up in reviewing the physics of the production of ultra-violet rays. This is done in a simple and understandable manner. There is also a good description of the various types of machines, and the differences between them explained.

In the last half of the book an outline is given of the treatment of the various diseases in which the authors have used the ultra-violet light with success. Other diseases are mentioned in which other writers claim results, but in which the authors have not succeeded in obtaining the desired effects. The book is attractively bound and is well illustrated.

W. L. RITCHIE

**A Short History of Anatomy.** By Richard H. Hunter, M.D. 51 pages. Price 75 cents. John Bale, Sons & Danielsson, London. The Macmillan Company of Canada, Toronto, 1925.

This little book is an excellent epitome of some of the most outstanding events and personalities in the history of anatomy from the ancient Egyptians to the passing of the Anatomy Act in Britain in 1832. It can be heartily recommended to students and others who desire a brief but accurate and well-written account of this subject. Ancient Chinese anatomy might perhaps have received mention.

Unfortunately the last page and a half constitute a deplorable anti-climax. We are given to understand that the history of anatomy came to a close with the passing of the Anatomy Act in Britain almost a century ago and Barclay's well-known simile is quoted in which anatomy is likened to a harvest field which has been completely garnered. Within the limits of a brief review this opinion cannot be discussed at length. An opinion strongly to the contrary must be indicated, however, and the seriousness of inculcating such an idea into the minds of students emphasized. In the influences to which they are subjected, the eagerness and enthusiasm of youth (provided they be united to real ability and conscientiousness) should encounter not the stifling repression of bigoted ancestor-worship but the stimulation of well-balanced historical scholarship, such as is to be found throughout this book (with the single exception under discussion), together with sympathetic encouragement and the sound guidance of experience in investigation, such as are offered by the competent teacher.

It is to be hoped that the call for a second edition will come soon, thus affording an early opportunity of removing this singular blemish from an otherwise admirable work.

I. M. THOMPSON

**Pædiatrics.** By various authors. Edited by Isaac A. Abt, M. D. Vol. iv, 1271 pages, 218 illustrations. Price \$11.00. W. B. Saunders Co., Philadelphia and London; Canadian Agents, the J. F. Hartz Co., Toronto, 1924.

The fourth volume of Abt's System of Pædiatrics maintains the high standard set by the first three volumes. The selection of the authors for the various subjects has been most fortunate with the result that the diseases have been covered in a most complete and capable manner. One is struck by the excellent way in which both the technical and clinical aspects are handled by each contributor so that the completed volume is equally as valuable as a reference book to the scientific investigator or as a help to the practicing physician who is anxious to know the more minute details of modern therapy.

For the most part the information is sound and thoroughly up to date; tedious discussions on theories which have not reached the accepted and proven stage have been studiously avoided. In only one chapter has there been any departure from this rule, viz., in the chapters dealing with the ductless glands. Here theorizing is not only excusable but unavoidable and the authors have treated a difficult subject in a very complete and entertaining manner. It is difficult to select the chapters deserving special mention but the writer was particularly impressed with the handling of Surgery of the Thorax by Evarts A. Graham. The accepted treatment of empyema is detailed and is preceded by a pertinent discussion of the physiology and mechanics of the thorax.

The chapters on the diseases of the blood by W. P. Lucas and E. C. Fleischner deserve special commendation, and the attention given to the treatment of the various types of anaemia will be much appreciated by the clinicians.

In the chapter dealing with the urine in infancy and childhood by S. Amberg the author has covered the subject in a most thorough manner, having completely reviewed the literature. The biochemist will find this monograph invaluable as a reference.

Criticisms of the volume are few and relatively unimportant, and apply to the volume as a whole rather than to individual contributions. One feels that there is to a certain extent a lack of balance when one compares the amount of space allotted to the various subjects. For example, infantilism, a relatively rare condition, occupies 46 pages, whereas Mongolian idiocy, a fairly common and frequently unrecognized condition is disposed of in thirty lines, unaccompanied by even an illustration. Tetany, also, has been somewhat scrimped considering the importance and prevalence of the disease and has been dealt with under the chapter on parathyroids. The advisability of this will be questioned by many paediatricians. Such criticisms, as said before, are relatively unimportant and do not detract from the general excellence of the work. It is safe to say that Abt's System bids well to be the most complete and valuable addition to paediatric literature that has yet appeared.

E. A. MORGAN

On March 29th Sir John Rose Bradford was elected President of the Royal College of Physicians of London in succession to Sir Humphry Rolleston, who retires after four years of office. Dr. R. O. Moon was elected assistant registrar.

**Chesterfield Royal Hospital.**—Although an additional ward was opened a year ago there is a waiting-list of nearly 400, and it is estimated that an expenditure of between £50,000 and £100,000 will be necessary to meet the growing demands upon the institution.

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**Physiologic Aspects of Glare.**—Glare is a conspicuous manifestation of our period: the glare of the footlights, the glare of the headlights, and the glare of the great white ways. Since the advent of the automobile, glare has become a subject of legislative enactments. It has been defined as "a brightness within the field of view of such an excessive character as to cause discomfort or interference with vision." Evidently the physiologic aspects of the subject need not be considered more critically, as has recently been attempted by Nowakowski at the School of Hygiene and Public Health at Johns Hopkins University. He has discovered that glare is a condition of visual discomfort which is dependent on two factors, both due to contrasts of illumination on the retina. One is attributable to the failure of the eye to adapt itself to a stimulus of small area and high intensity, in consequence of which there is irritation of the hypersensitive retina. The contrast between the glare spot and the surrounding retina produces discomfort that is proportional to the intrinsic brilliancy of the glare light. The other factor is a depression of visual acuity when there is a sufficient contrast between the illumination of the glare spot and that of the fovea. The depression of central vision by peripheral glare has been experimentally measured by Nowakowski. Probably central glare gives a similar depression of peripheral vision. Visual disturbance, we are told, is proportional to candle power; local irritation, to intrinsic brilliancy; and discomfort, to a combination of the factors. It is possible, further, that oculomotor reflexes may be started by the over-stimulation of the light-perceiving elements of the retina and thus add to the discomfort. These considerations have led to the abandonment of some of the older physiologic explanations of the phenomenon of glare. The diffraction of the lens is no longer held responsible for it. The hypothesis that the effect is due to a psychologic inhibition and the trouble therefore located in the central nervous system likewise seems untenable; for change in visual acuity produced by glare in one eye is without effect on the other, contrary to what would be expected if the nervous centers were concerned in the result. It is important to recognize clearly that the discomfort due to glare is actually

attended with impaired efficiency of the eye.—*Jour. A.M.A.*, Feb. 13, 1926.

**Pigmented Moles.**—Among the most important and most difficult aspects of a practitioner's work are such little lesions as the nevi. Frequently the physician must decide whether or not a pigmented mole is malignant or benign; and if benign, whether or not it is likely to assume malignancy. The melanin forming cells, specific in their function, are called melanoblasts. These melanoblasts are able to produce pigment and to give rise to other cells of their own nature. They lie in the basal cell layer of the rete malpighii and can produce pigment in response to any adequate stimulus. The production of a nevus involves the departure of these cells from their original epithelial nature and their migration into the corium. This phenomenon may occur anywhere in the body but is found more often on the face and neck, perhaps because of the likelihood there of irritation. Since the cells, after migration, are still capable of producing melanin, they may, after a period of slow growth, become quiescent, or they may undergo malignant change. In those nevi which remain benign, the regression that takes place is a fibrosis. This does not mean, however, that all benign moles will remain macular, become less noticeable and fade in colour. Some of them may become warty, nodular and mamillated. The size or contour of the nevus, then, is not in itself an indication of safety or of danger. A complete study of melanomas has just been issued as a monograph, forming a single issue of a foreign periodical. Dr. James W. Dawson there indicates the significant signs in a mole that is undergoing malignant change. Increased vascularity and pigmentation, or superficial ulceration with periods of bleeding and subjective symptoms, are signals of warning. A history of trauma or mechanical irritation is usually obtained in such cases and is not to be taken lightly. Such history and signs justify wide extirpation, and a microscopic study of the tissue removed will show pigmentation and proliferation beyond the area in which pigmentation can be detected by the naked eye. If the extirpation is not sufficiently wide, not only has pathologic tissue been left in situ, but also more harm than good may have been done by opening channels of



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metastasis into subepidermal layers or into the lymphatic nodes of adjacent regions. Should the lymph nodes be involved, Pringle advises "excision of the tumour, with a good zone of healthy skin around it and a somewhat larger zone of the underlying deep fascia, up to and including the nearest anatomical group of glands at least; and all that is removed should be in one continuous strip as far as possible."—*Jour. A.M.A.*, Oct. 31, 1925.

**Maternal Mortality.**—A lecture entitled "The problem of our high maternal and infantile mortality and morbidity" was delivered on February 11th by Professor B. P. Watson, in the Gartshore Hall, Edinburgh, under the auspices of the Edinburgh Women Citizens' Association. Lady Findlay, who presided, said that she hoped public opinion might be stimulated to try to remove some of the causes of the high mortality. Children had wonderful vitality, and given a normal, healthy environment would thrive without much care or attention. Unfortunately, however, the conditions under which children lived to-day were far from being normal, as they were deprived of light and air under the miserable housing conditions of our cities. In her opinion most of our social evils came from the housing conditions in overcrowded cities. Professor Watson pointed out that the maternal death rate in Scotland was 6.2 per 1,000. Scotland was in the unenviable position of having one of the highest maternal death rates, the lowest death rate being in the Netherlands and the highest in Spain. Under present economic conditions it was not possible that every child should be born in a properly equipped institution, but he hoped the day would come when that would be the case. Preventive medicine as applied to midwifery consisted of proper ante-natal care. Clinics should be established in every large centre of population. Ante-natal care had really begun in Edinburgh under the late Dr. J. W. Ballantyne, who was the first to see the tremendous importance of this aspect of preventive medicine. The first ante-natal bed to be endowed had been in the Royal Maternity Hospital at Edinburgh, but more hospital accommodation was needed for maternity work. Large sums of money had been given to general hospitals and infirmaries, but the maternity hospitals had been left out for the most part. In his opinion, the modern tendency to link up the maternity hospital with the general hospital was to the good. In Edinburgh an affiliation between the new maternity hospital and the Royal Infirmary would be welcomed, and he thought this would bring about a diminution in cost and an increase in efficiency.—*Brit. Med. Jour.*, Feb. 13, 1926.

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